

STUDENT'S GUIDE
FOR
ENLISTED BASIC AVIATION TRAINING
C-000-2010

PREPARED BY
NAVAL AIR TECHNICAL TRAINING CENTER
NAVAL AIR STATION MEMPHIS
MILLINGTON, TENNESSEE 38054

PREPARED FOR
CHIEF OF NAVAL TECHNICAL TRAINING
CNTT-M 1693

JUNE 1984

FOREWORD

The Enlisted Basic Aviation Training Course is an apprentice level Navy training course which provides prerequisite training for Navy and Marine Corps personnel attending Class A1 Schools at NATTC Memphis. EBAT is a group-paced, computer-managed course and is ten working days long.

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SCHOOL REGULATIONS

Marching

All Class A1 students, E-4 and below, are required to march to and from school. EBAT students will muster at the designated area and march to school by class. The class leader will be responsible for mustering and marching his/her class.

Military Appearance/Grooming

You are expected to maintain a clean, well groomed military appearance at all times. While attending EBAT, you are subject to daily personnel inspections, with monthly command personnel inspections held as announced. Your appearance reflects self-pride; ensure that yours is smart and well-groomed; it's your responsibility.

Conduct

Trainees shall refrain from loud talking or making noise in the passageways. Always clear a passage for seniors or visiting civilians - Call "Gang-way" if you see that the way is blocked.

Classroom Discipline

Sleeping, conversing with other trainees or causing disturbances during instruction is detrimental to the maintenance of classroom discipline. Tilting chairs back, placing feet on chairs in the row ahead, or inattentiveness is prohibited. Writing on, scratching or otherwise mutilating desks, bulkheads, work benches, furniture, lockers, or equipment constitutes damaging of Government property and is prohibited. Conduct enumerated above can result in non-judicial punishment as offenses under the Uniform Code of Military Justice.

The possession of nontechnical literature by trainee personnel in any school area is prohibited. The only literature authorized will pertain to the subjects to be taught.

Clean-up

At the end of the school day, each class will be responsible for the clean-up in their classroom. The class leader will make daily clean-up assignments.

Field day will be held once a week as announced by the instructor.

Breaks

Breaks will be authorized by your instructor at designated times. The student break area is the only place you are authorized to smoke or consume food. Food will NOT be brought into the classroom.

Beverages, such as coffee, tea, or soft drinks, are authorized in the classroom.

The student break area is a privilege, NOT a right. Keep the area clean or it will be secured.

Chain-of-Request/Special Command

Special requests will be handled on a case-by-case basis, with the first step being your Company Commander.

Your chain-of-command in EBAT starts with your class leader and the goes to your instructor. If any problem or situation arises and you need to talk to someone, use your chain-of-command. It's your right!

Chain-of-Command (in EBAT)

1. Class Leader
2. Instructor
3. Unit Supervisor
4. LCPO/Course Supervisor
5. Training Officer

CLASS HOURS

MUSTER: _____

CHOW: _____

CLEAN-UP: _____

ALCOHOLIC BEVERAGES The state law in Tennessee prohibits persons under 19 years of age from consuming any alcoholic beverage. The state of Arkansas prohibits persons under 21 years of age from consuming any alcoholic beverages. The state of Mississippi prohibits any persons under 18 years of age from consuming any alcoholic beverage. Base regulations to Tennessee state law. The regulation is enforced at NATTC Memphis. Drinking as a minor, drinking in a duty status, and drinking to excess (intoxicated) while in a liberty status are prohibited and are offenses against the UCMJ, punishable by a courtmartial. The Implied Consent Law is in effect in Tennessee and NAS Memphis: If one is suspected of driving under the influence of alcohol or drugs, the suspect must submit to a blood test. Failure to submit will result in revocation of driving privileges for not less than 6 months nor more than 2

years. Alcoholic beverages are not allowed in any of the NATTC BEQ's.

ILLEGAL
DRUGS

The use of possession, selling or transfer of drugs on the Drug Enforcement Agency list of illegal drugs is prohibited and is a court-martial offense. Because of its hallucinatory effect, marijuana is dangerous and its use is inconsistent with military responsibilities. Its use of possession is prohibited in Tennessee as well as on station.

SAFETY NOTICE

Safety is an attitude, a frame of mind. It is the conscious awareness of one's environment and actions all day, every day. Safety is knowing what is going on, knowing what can injure anyone or anything, and knowing how to prevent that injury. To ignore safe practices does not indicate a brave person, only a foolish one, and to do anything safely and correctly is the mark of a wise person, not a timid one. It is our responsibility here at EBAT to provide you with as much accident awareness and knowledge as we are able.

Throughout Naval Aviation, safety is paramount. Let safety and safe practices be with you always.

HOW TO USE THIS STUDENT GUIDE

This student guide is designed for you to use while attending Enlisted Basic Aviation Training, and to be kept by you when you complete the course.

Information sheets are provided for all the Units and contain the lesson objectives for each Unit. Studying these information sheets will tell you exactly what you are required to know at the end of each Unit.

Notetaking sheets are provided for most lessons taught. USE THEM! They are your most valuable studying tool.

Assignment sheets and job sheets are utilized on a few lessons. Assignment sheets are to be done in the evenings, ready for turn-in the following morning. Job sheets will be completed in a laboratory environment with an instructor's assistance.

A master schedule of all your classes has been provided to keep you updated on daily routine.

HOMEWORK ASSIGNMENTS

You are expected to study on a nightly basis the notes taken during the day's lessons.

Assignment Sheets 2.1.1A, 2.2.1A, and 2.3.1A will be due at the beginning of class period 17. Assignment Sheets 2.4.1A and 2.4.2A will be due at the beginning of class period 25.

Homework is given as a teaching tool to ensure your understanding of the material taught.

Failure to complete your homework assignments could result in disciplinary action.

**MASTER SCHEDULE
ENLISTED BASIC AVIATION TRAINING**

FIRST WEEK

Topic No.	Type	Period	Topic	Ratio
First Day				
0.1	Class	1	Indoctrination/Orientation Into Enlisted Basic Aviation Training	35/1
		2		
		3		
1.1		4	History of Naval and Marine Corps Aviation	35/1
1.2		5	Theory of Flight	35/1
		6		
1.3		7	Aircraft Designation	35/1
Test		8	Written Test on Unit 1	35/1
Second Day				
2.1	Class	9	Whole Numbers	35/1
		10		
2.2		11	Fractions	35/1
		12		
2.3		13	Decimals	35/1
		14		
2.4		15	Basic Algebra	35/1
		16		
Third Day				
2.4	Class	17	Basic Algebra	35/1
		18		
		19		
		20		
		21		
		22		
		23		
		24		
Fourth Day				
Test	Class	25	Written Test on Unit 2	35/1
3.1		26	Navy and Marine Corps Aviation Organization	35/1
		27		
		28		
		29		
4.1		30	Basic Aircraft Systems-Powerplants (AD)	35/1
4.2		31	Basic Aircraft Systems-Aviation Structural Mechanic, Safety Equipment (AME)	35/1
4.3		32	Basic Aircraft Hydraulics/ Pneumatic Systems (AMH)	35/1

Topic No.	Type	Period	Topic	Ratio
<u>Fifth Day</u>				
4.4	Class	33	Aviation Structural Mechanic, (Structures) (AMS)	35/1
4.5		34	Basic Aircraft Avionics Systems (AT,AX)	35/1
4.6		35	Basic Aircraft Electrical/ Instrumentation Systems (AE)	35/1
4.7		36	Basic Aircraft Weapons Systems (AO)	
Test		37	Written Test on Unit 3 and 4	35/1
5.1	Class	38	Technical Manuals	35/1
		39		
5.2	Class	40	Planned Maintenance System (PMS)	35/1

SECOND WEEK

Topic No.	Type	Period	Topic	Ratio
<u>First Day</u>				
		41		
5.3	Class	42	Maintenance Data System (MDS)	35/1
		43		
5.4	Class	44	Maintenance Data Forms (VIDS/MAF & SAF)	35/1
		45		
5.5	Lab	46	NAMP Lab	8/1
		47		
		48		
<u>Second Day</u>				
	Lab	49	NAMP Lab	8/1
		50		
		51		
		52		
		53		
Test	Class	54	Written Test on Unit 5	35/1
6.1	Class	55	Support Equipment (SE)	35/1
		56		
<u>Third Day</u>				
6.1	Class	57	Support Equipment (SE)	35/1
7.1		58	Aircraft Cleaning	35/1
		59		
7.2		60	Corrosion Control	35/1
		61		
8.1		62	Halocarbon Safety	35/1
8.2		63	Firefighting	35/1
		64		
<u>Fourth Day</u>				
8.3	Class	65	Foreign Object Damage (FOD)	35/1
Test		66	Written Test on Units 6,7 & 8	35/1
9.1		67	Tool Control	35/1
9.2		68	Common Handtools	35/1
		69		35/1
9.3		70	Aircraft Hardware	35/1
9.4		71	Torquing and Safetying	35/1
Test		72	Written Test on Unit 9	35/1
<u>Fifth Day</u>				
9.5	Lab	73	Tool Control	8/1
		74	Common Handtools	8/1
		75	Aircraft Hardware	8/1
		76	Torquing and Safetying	8/1
Test	Lab	77	Performance Test Shop Project	8/1
		78		8/1
		79		8/1
		80		8/1

INFORMATION SHEET 1.0.1I

AIRCRAFT FUNDAMENTALS

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit I.

TERMINAL OBJECTIVE

1.0 DEMONSTRATE a knowledge of Naval and Marine Corps Aviation history, aircraft structures, control surfaces, and designation of naval aircraft by SELECTING or MATCHING the correct answers from lists provided.

ENABLING OBJECTIVES

1.1 SELECT, from a list provided, the statement that describes the mission of the Naval and Marine Corps air arm.

1.1.1 MATCH the Naval and Marine Corps aviation historical dates listed in column "A" with the correct historical events listed in column "B".

1.1.2 SELECT, from a list provided, the statement containing four major battles in which the naval air arm played an important role.

1.2 MATCH the terms: aerodynamics, aircraft stability, angle of attack, angle of incidence, listed in column "A", with its definition, listed in column "B".

1.2.1 MATCH each of the three aircraft axes, listed in column "A", with its associated primary flight control, listed in column "B".

1.2.2 MATCH each primary flight control surface, listed in column "A", with its illustrated location, listed in column "B".

1.2.3 MATCH each aircraft axes, listed in column "A" with its associated movement, listed in column "B".

1.2.4 SELECT, from a list provided, the four principal structural units of an aircraft.

1.2.5 MATCH each of the four forces of flight, listed in column "A", with its identifying characteristic, listed in column "B".

1.2.6 MATCH each of the five stresses that act on an aircraft in flight, listed in column "A," with its definition, listed in column "B".

1.2.7 MATCH the helicopter terms: collective pitch control stick, cyclic pitch control stick, main rotor and tail rotor, listed in column "A", with its purpose, listed in column "B".

1.3 SELECT, from a list provided, the purpose of the military aircraft designation system.

1.3.1 SELECT, from a list provided, the symbol common to all military aircraft designations.

1.3.2 MATCH each aircraft designation symbol, listed in column "A", with the information each symbol represents, listed in column "B".

NOTETAKING SHEET 1.1.1N

HISTORY OF NAVAL AND MARINE
CORPS AVIATION

REFERENCES:

1. NAVAL ORIENTATION, NAVPERS 16138F, Chapter 17
2. THE U. S. NAVY IN PENSACOLA, Pearce, G. F., Chapters 7 & 8
3. A CONCISE HISTORY OF THE UNITED STATES MARINE CORPS 1775 - 1969
Historical Division Headquarters, U. S. Marine Corps Washington, D. C., chapters 7 & 8

NOTETAKING OUTLINE:

I. Mission of the Naval Air Arm.

A. The mission of the naval air arm is to _____

B. The function of the naval air arm.

1. Scouting _____
2. Aiding _____
3. Supporting and _____
4. Provide _____
5. Search and _____

II. Naval and Marine Corps historical dates and events.

A. 14 November 1910 _____

B. December 1910 _____

C. 1911 _____

D. July 1911 _____

E. 22 May 1912 _____

F. 6 May 1914 _____

G. 14 July 1914 _____

H. 16 April 1915 _____

I. 6 April 1917 _____

J. 1922 _____

K. 1928 _____

L. June 1934 _____

M. 1939 _____

N. 1940 _____

III. World War II

A. 7 December 1941 _____

B. 4 - 8 May 1942 _____

C. 3 & 4 June 1942 _____

D. 7 August 1942 _____

E. June 1944 _____

F. During WWII the Marine Corps had its peak number of units:

NOTETAKING SHEET 1.2.1N

THEORY OF FLIGHT

REFERENCES:

AIRMAN, NAVEDTRA 10307-E, Chapters 3 & 4

NOTETAKING OUTLINE:

I. Terms and Definitions

A. Aerodynamics

Definition - _____

B. Aircraft stability

1. Definition - _____

2. Three axes

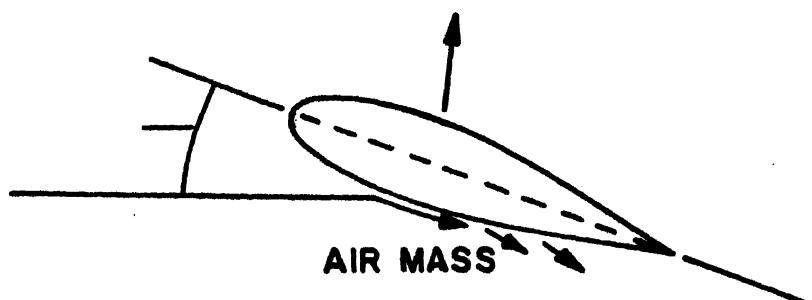
a. _____

b. _____

c. _____

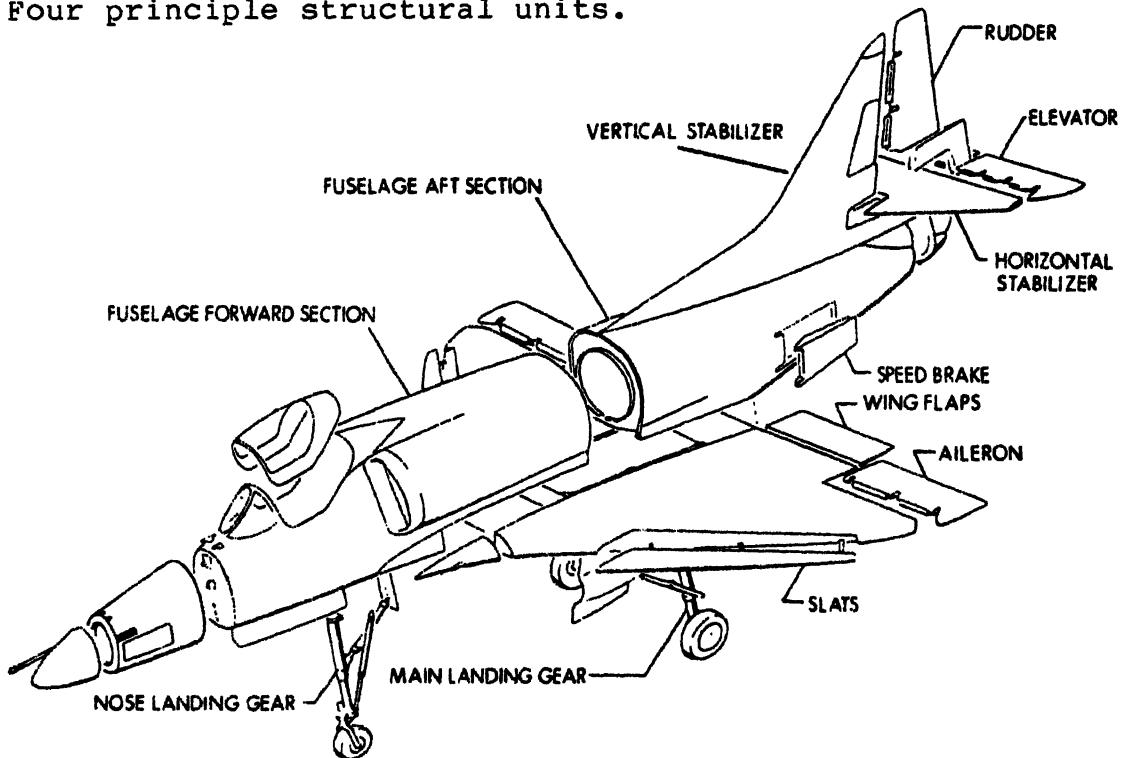
C. Angle of attack (AOA)

Definition - _____



D. Angle of incidence

II. Four principle structural units.



A. _____

B. _____

C. _____

1. _____

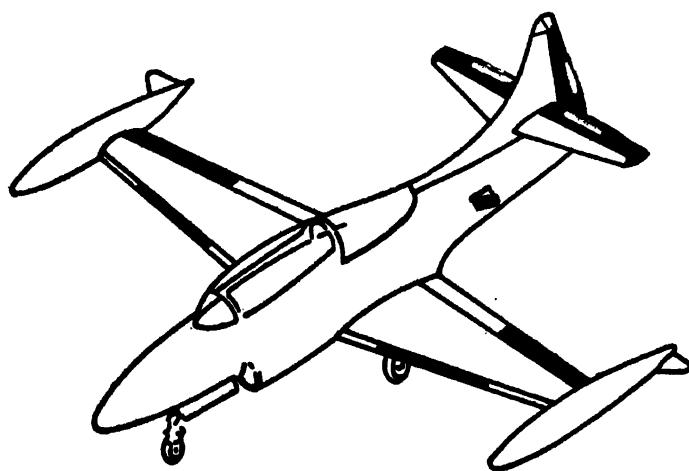
2. _____

3. _____

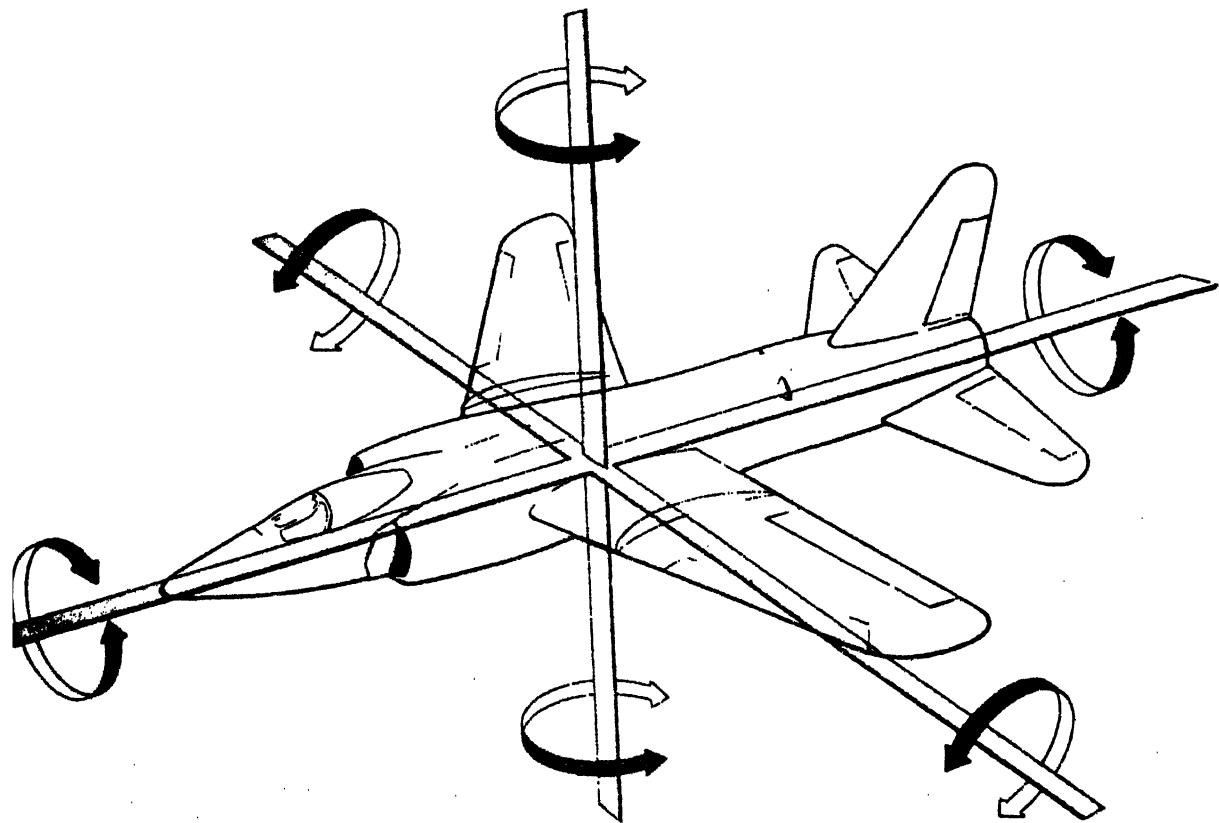
D. _____

Definition - _____

III. Flight control surfaces and their locations.



IV. Axes with associated flight controls and associated movements.

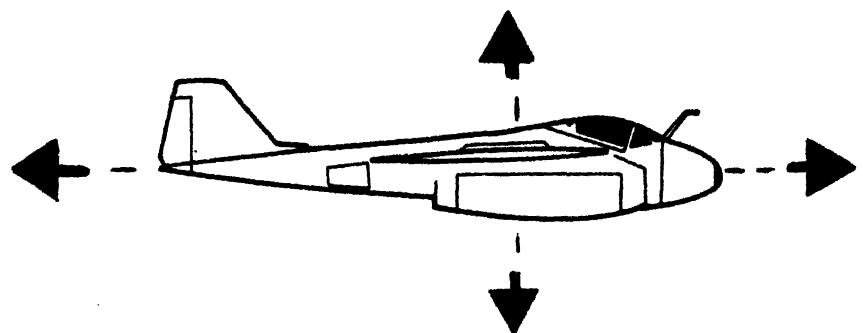


A. Longitudinal Axis - _____

B. Lateral Axis - _____

C. Vertical Axis - _____

V. Four Forces Affecting Flight



- A. _____
- B. _____
- C. _____
- D. _____

VI. Five Stress on an Aircraft

- A. _____
- B. _____
- C. _____
- D. _____

VII. Helicopter Principles Terms, And Definitions

- A. Principles - The main difference between a helo and a fixed wing _____

- B. Main Rotor

1. _____

2. _____

3. _____

C. Tail Rotor

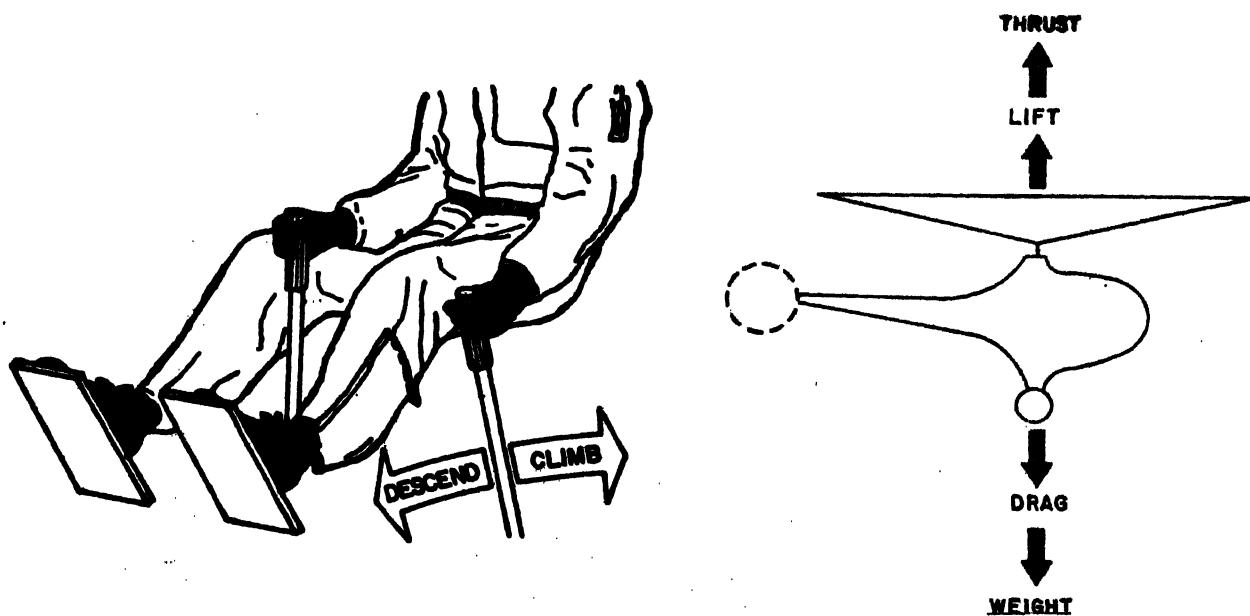
1. _____
2. _____
3. _____

D. Collective pitch control stick

1. _____
2. _____
3. _____
4. _____

E. Cyclic Pitch Control Stick

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____



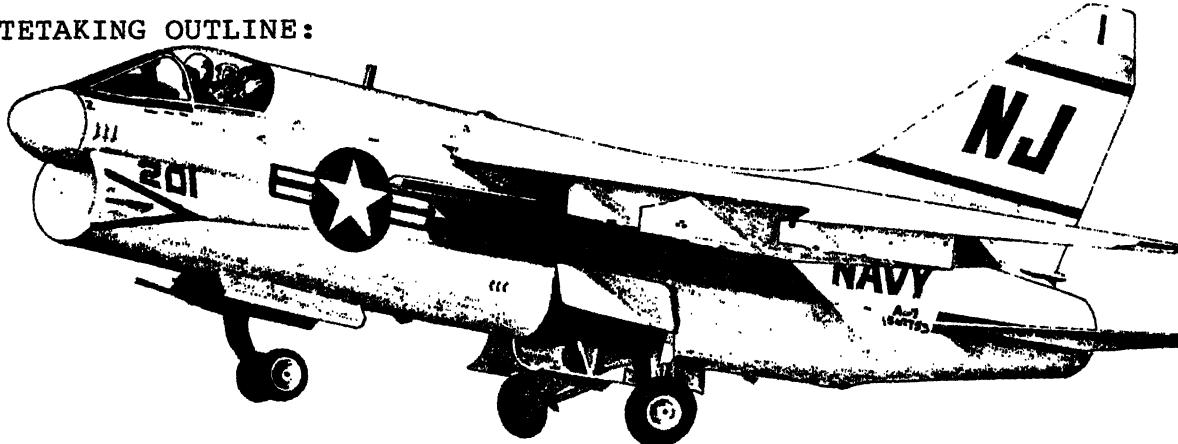
NOTETAKING SHEET 1.3.1N

AIRCRAFT DESIGNATION

REFERENCES:

NAVEDTRA 10307-E, Airman, Chapter 5

NOTETAKING OUTLINE:



I. Purpose of Military Aircraft Designation - _____

II. Symbol common to all Aircraft Designations - _____

III. Symbols with Implied Information - $\frac{E}{B} \frac{A}{A} - \frac{6}{C} \frac{B}{D}$

A. Identifies basic mission - _____

B. Identifies modified mission - _____

C. Specifies design or model of the aircraft _____

D. Indicates a change in original design - _____

INFORMATION SHEET 2.0.11

BASIC MATHEMATICS

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit II.

TERMINAL OBJECTIVE

2.0 SOLVE given mathematical problems involving (1) addition, subtraction, multiplication and division of whole numbers, fractions and decimals; (2) signed numbers and basic algebra.

ENABLING OBJECTIVES

2.1 Solve two given mathematical problems in addition, subtraction, multiplication and division of whole numbers.

2.2 SOLVE two given mathematical problems in addition, multiplication, subtraction and division of fractions.

2.2.1 SELECT, from a list provided, the two parts of a fraction.

2.2.2 SELECT, from a list provided, the definition of a numerator and a denominator.

2.2.3 REDUCE four given fractions, each to its lowest terms.

2.2.4 MATCH each of the three types of fractions, listed in column "A", with its example, listed in column "B".

2.2.5 MATCH each fraction, listed in column "A", with its equivalent decimal, listed in column "B".

2.2.6 MATCH each improper fraction, listed in column "A", with its equivalent mixed number, listed in column "B".

2.2.7 SOLVE and REDUCE to their lowest terms four given multiplication problems involving proper fractions.

2.2.8 SOLVE and REDUCE to their lowest terms four given multiplication problems involving proper fractions, utilizing the cancellation process.

2.2.9 SOLVE and REDUCE to their lowest terms four given division problems involving proper fractions, utilizing the cancellation process.

2.2.10 MATCH each mixed number, listed in column "A", with its improper fraction, listed in column "B".

2.2.11 SOLVE and REDUCE to their lowest terms four given addition and subtraction problems involving mixed numbers.

2.2.12 SOLVE and REDUCE to their lowest terms four given multiplication problems involving mixed numbers, utilizing the cancellation process.

2.2.13 SOLVE and REDUCE to their lowest terms four given division problems involving mixed numbers.

2.3 SOLVE two given mathematical problems in the addition, multiplication, subtraction and division of decimals.

2.3.1 SELECT, from a list provided, the definition of a decimal.

2.3.2 ROUND OFF four given decimals to the nearest thousandth place.

2.3.3 MATCH each of the four decimals, listed in column "A", with its written equivalent, listed in column "B".

2.3.4 MATCH four decimal addition problems, listed in column "A", with its correct solution, listed in column "B".

2.3.5 MATCH four decimal subtraction problems, listed in column "A", with its correct solution, listed in column "B".

2.3.6 MATCH four decimal multiplication problems, listed in column "A", with its correct solution, listed in column "B".

2.3.7 MATCH four decimal division problems, listed in column "A", with its correct solution, listed in column "B".

2.3.8 MATCH each of the four decimals, listed in column "A", with its equivalent fraction, listed in column "B".

2.3.9 MATCH each of the four decimals, listed in column "A", with its equivalent ruler fraction, listed in column "B".

2.4 SOLVE two given algebra problems involving basic algebra.

2.4.1 SOLVE two given mathematical problems involving addition and subtraction of positive and negative numbers.

2.4.2 SOLVE given mathematical problems involving addition of positive (2) and negative (2) numbers.

2.4.3 SOLVE given mathematical problems involving division of positive (2) and negative (2) numbers.

- 2.4.4 MATCH algebraic terminology, listed in column "A", to its definition, listed in column "B".
- 2.4.5 MATCH algebraic laws/rules of operation listed in column "A", to its correct example, listed in column "B".
- 2.4.6 Given numerical values for literal numbers, EVALUATE basic algebraic expressions.
- 2.4.7 EVALUATE algebraic expressions involving multiplication, division, addition, and subtraction of monomials and polynomials. Algebraic laws/rules of operation must be used.

NOTETAKING SHEET 2.1.1N

ADDITION, SUBTRACTION, MULTIPLICATION,
AND DIVISION OF WHOLE NUMBERS

REFERENCES:

MATHEMATICS, NAVEDTRA 10069-D, Volume 1

NOTETAKING OUTLINE:

I. Whole Numbers

A. Definition - _____

B. Position Notation - _____

C. Positive Integers - _____

II. Addition of Whole Numbers.

A. Definition - _____

B. Signified by - _____

C. Parts of a problem - _____

D. Grouping - _____

E. Carrying - _____

III. Subtraction of Whole Numbers.

A. Definition - _____

B. Signified by - _____

C. Parts of a problem - _____

D. Grouping - _____

E. Borrowing - _____

IV. Multiplication of Whole Numbers.

A. Definition - _____

B. Signified by - _____

C. Parts of a problem - _____

D. Grouping - _____

E. Carrying - _____

V. Division of Whole Numbers.

A. Definition - _____

B. Signified by - _____

C. Parts of a problem - _____

D. Grouping - _____

E. Borrowing - _____

F. Checking accuracy - _____

ASSIGNMENT SHEET 2.1.1A

ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION OF WHOLE NUMBERS

INTRODUCTION

The purpose of this assignment sheet is to supply practice, to the student, in solving addition, subtraction, multiplication, and division problems involving whole numbers.

LESSON TOPIC LEARNING OBJECTIVES

2.1 Solve give mathematical problems in addition, subtraction, multiplication, and division of whole numbers.

STUDY ASSIGNMENT

Review Notetaking Sheet 2.1.1N and complete assignment below.

STUDY QUESTIONS

1. Solve the following addition problems.

a. $982 + 82 + 9984 =$ c. 2482
b. $12,384 + 8,215 + 73,822 =$ 7821
 5532
 +4681

2. Solve the following subtraction problems.

a. $89,784 - 7,893 =$ c. 889,988
b. $1,437 - 1,398 =$ -888,999

3. Solve the following multiplication problems.

a. $37,421 \cdot 857 =$ c. 751,852
b. $(454,545) (17) =$ x434

4. Solve the following division problems.

a. $184,896 \div 576 =$ c. 545 / 297,025
b. $907,350 \div 345 =$

NOTETAKING SHEET 2.2.1N

FRACTIONS

REFERENCES:

NAVEDTRA 10069-D, Mathematics, Volume 1

NOTETAKING OUTLINE:

I. Parts of a fraction

A. _____

B. _____

II. Definition

A. _____

B. _____

III. Types of fractions

A. Proper - _____

B. Improper - _____

C. Mixed Number - _____

IV. Improper fractions and equivalent mixed numbers

A. _____

B. _____

V. Reduce fractions to lowest terms

A. _____

B. _____

C. _____

VI. Add and Subtract proper fractions

A. Adding

1. _____

2. _____

B. Subtracting

1. _____

2. _____

VII. Multiply and reduce proper fractions

A. Multiply

1. _____

2. _____

3. _____

4. _____

B. Reduce - _____

VIII. Multiply proper fractions utilizing cancellation process

A. Multiply

1. _____

2. _____

3. _____

B. Reduce - _____

Note: _____

IX. Divide and Reduce proper fractions

A. Divide proper fractions

1. Common Denominator method

a. _____

b. _____

c. _____

d. _____

e. _____

2. Reciprocal method

a. _____

b. _____

Note: _____

B. Reduce - _____

X. Add and Subtract mixed numbers

A. Add

1. _____

2. _____

3. _____

B. Subtract

1. _____

2. _____

3. _____

C. Reduce - _____

XI. Multiply mixed numbers utilizing cancellation method

A. Multiply

1. _____

2. _____

3. _____

B. Reduce - _____

XII. Divide mixed numbers

A. Divide

1. Common Denominator method

a. _____

b. _____

c. _____

2. Reciprocal method

a. _____

b. _____

c. _____

Note: _____

B. Reduce - _____

ASSIGNMENT SHEET 2.2.1A

FRACTIONS

INTRODUCTION

The purpose of this assignment sheet is to supply practice problems to the student in solving mathematical operations involving fractions.

LESSON TOPIC LEARNING OBJECTIVES

- 2.2 SOLVE two given mathematical problems in addition, subtraction, multiplication and division of fractions.
- 2.2.1 SELECT, from a list provided, the two parts of a fraction.
- 2.2.2 SELECT, from a list provided, the definition of a numerator and a denominator.
- 2.2.3 REDUCE four given fractions, each to its lowest terms.
- 2.2.4 MATCH each of the three types of fractions, listed in column "A", with its example, listed in column "B".
- 2.2.5 MATCH each fraction, listed in column "A", with its equivalent decimal, listed in column "B".
- 2.2.6 MATCH each improper fraction, listed in column "A", with its equivalent mixed number, listed in column "B".
- 2.2.7 SOLVE and REDUCE to their lowest terms four given multiplication problems involving proper fractions.
- 2.2.8 SOLVE and REDUCE to their lowest terms four given multiplication problems involving proper fractions, utilizing the cancellation process.
- 2.2.9 SOLVE and REDUCE to their lowest terms four given division problems involving proper fractions, utilizing the cancellation process.
- 2.2.10 MATCH each mixed number, listed in column "A", with it's improper fraction, listed in column "B".
- 2.2.11 SOLVE and REDUCE to their lowest terms four given addition and subtraction problems involving mixed numbers.
- 2.2.12 SOLVE and REDUCE to their lowest terms four given multiplication problems involving mixed numbers, utilizing the cancellation process.

2.2.13 SOLVE and REDUCE to their lowest terms four given division problems involving mixed numbers.

STUDY ASSIGNMENT

Review Notetaking Sheet 2.2.1N and complete Study Questions below

1. In the list below, circle the two parts of a fraction.
 - a. Dividend
 - b. Denominator
 - c. Multiplicand
 - d. Numerator
 - e. Addend
2. From the list provided below, circle the definition of (1) Numerator, and (2) Denominator.
 - a. NUMERATOR, indicates how many parts the whole has been divided into.
 - b. NUMERATOR, indicates how many parts of the whole are being considered.
 - c. DENOMINATOR - indicates how many parts of the whole are being considered.
 - d. DENOMINATOR - indicates how many parts the whole has been divided into.
3. MATCH the type fractions in column "A" to its correct example listed in column "B".

<u>A</u>	<u>B</u>
_____ a. Proper fraction	1. $2 \frac{1}{4}$
_____ b. Mixed number	2. $\frac{3}{2}$
_____ c. Improper fraction	3. $\frac{2}{5}$

4. MATCH each improper fraction in column "A" to its equivalent mixed number in column "B".

<u>A</u>	<u>B</u>
_____ 1. $\frac{10}{8}$	a. $1 \frac{1}{3}$
_____ 2. $\frac{6}{4}$	b. $1 \frac{1}{4}$
_____ 3. $\frac{8}{6}$	c. $1 \frac{1}{2}$

5. Reduce the below fractions to the lowest possible terms.

a. $\frac{8}{16}$

d. $\frac{8}{12}$

b. $\frac{6}{10}$

c. $\frac{5}{3}$

6. Solve and Reduce.

a. $\frac{4}{16}$
+ $\frac{2}{32}$

b. $\frac{8}{12}$
+ $\frac{8}{72}$

c. $\frac{1}{2}$
- $\frac{3}{16}$

d. $\frac{8}{12}$
- $\frac{4}{16}$

7. Solve and Reduce.

a. $\frac{2}{3}$
x $\frac{5}{8}$

b. $\frac{3}{8}$
x $\frac{5}{16}$

c. $\frac{9}{16} \div \frac{7}{16} =$

d. $\frac{1}{8} \div \frac{1}{3} =$

8. Solve and Reduce

a. $\frac{4}{9} \frac{3}{4}$
+ $\frac{3}{5}$

b. $\frac{5}{6} \frac{7}{32}$
+ $\frac{1}{64}$

c. $\frac{5}{2} \frac{3}{5}$
- $\frac{2}{25}$

d. $\frac{8}{4} \frac{16}{48}$
- $\frac{1}{4}$

9. Solve and Reduce.

a. $\frac{2}{3} \frac{1}{3}$
x $\frac{1}{4}$

b. $\frac{5}{4} \frac{2}{3}$
x $\frac{1}{4}$

c. $3 \frac{1}{8} \div 1 \frac{1}{3} =$

d. $2 \frac{1}{2} \div 1 \frac{3}{4} =$

NOTETAKING SHEET 2.3.1N

DECIMALS

REFERENCES:

NAVEDTRA 10069-D, MATHEMATICS, Volume 1

NOTETAKING OUTLINE:

I. Definition of a decimal

A. _____
B. _____

II. Place value and written equivalents

A. Place value - _____

B. Written equivalents - _____

III. Rounding off decimals

A. _____

B. _____

C. _____

IV. Decimals and equivalent fractions

A. Decimals to equivalent fractions

1. _____

2. _____

3. _____

4. _____

B. Fractions to equivalent decimals

1. _____

2. _____

3. _____

4. _____

5. _____

V. Decimals and equivalent "ruler" fractions

A. _____

B. _____

VI. Adding decimals

A. _____

B. _____

C. _____

D. _____

VII. Subtracting decimals

A. _____

B. _____

C. _____

D. _____

VIII. Multiplying decimals

A. _____

B. _____

C. _____

D. _____

IX. Dividing decimals

A. _____

B. _____

C. _____

D. _____

ASSIGNMENT SHEET 2.3.1A

DECIMALS

INTRODUCTION:

The purpose of this assignment sheet is to supply practice problems to the student in solving operations involving decimals.

LESSON TOPIC LEARNING OBJECTIVES:

- 2.3 SOLVE two given mathematical problems in the addition, multiplication, subtraction and division of decimals.
- 2.3.1 SELECT, from a list provided, the definition of a decimal.
- 2.3.2 ROUND OFF four given decimals to the nearest thousandth place.
- 2.3.3 MATCH each of the four decimals, listed in column "A", with its written equivalent, listed in column "B".
- 2.3.4 MATCH four decimal addition problems, listed in column "A", with its correct solution, listed in column "B".
- 2.3.5 MATCH four decimal subtraction problems, listed in column "A", with its correct solution, listed in column "B".
- 2.3.6 MATCH four decimal multiplication problems, listed in column "A", with its correct solution, listed in column "B".
- 2.3.7 MATCH four decimal division problems, listed in column "A", with its correct solution, listed in column "B".
- 2.3.8 MATCH each of the four decimals, listed in column "A", with its equivalent fraction, listed in column "B".
- 2.3.9 MATCH each of the four decimals, listed in column "A", with its equivalent rules fraction, listed in column "B".

STUDY ASSIGNMENT

Review Notetaking Sheet 2.3.1N and complete the Study Questions below.

STUDY QUESTIONS:

1. In the below listed decimals, round to the nearest thousandth
 - a. .0036
 - b. .74218
 - c. .07324
 - d. .36483
2. Solve:
 - a. $21.08733 + .00176$
 - b. $.00421 + .0420$
 - c. $9821.74 - .07324$
 - d. $.742185 - .73987$
3. Solve:
 - a. $.876 \times .09$
 - b. $1.437 \times .897$
 - c. $.45 \div .005$
 - d. $.018 \div 90$
4. On the line provided, write the equivalent fraction for each of the decimals:
 - a. $.4 =$ _____
 - b. $.6 =$ _____
 - c. $.66 =$ _____
 - d. $.8333 =$ _____
5. On the line provided, write the equivalent "ruler" fraction for each of the decimals.
 - a. $.25 =$ _____
 - b. $.625 =$ _____
 - c. $.0625 =$ _____
 - d. $.125 =$ _____

NOTETAKING SHEET 2.4.1N

SIGNED NUMBERS and BASIC ALGEBRA

REFERENCES:

NAVEDTRA 10069-D, Mathematics, Volume I

NOTETAKING OUTLINE:

I. Signed numbers:

- A. Positive (+) or negative (-) signify _____.
- B. Used as a _____.
- C. Absolute Value is the numerical value of the number with the _____ dropped.

II. Addition and Subtraction of signed numbers

A. Addition

1. Law of adding LIKE SIGNS

- (1) Add the _____ of the numbers
- (2) Attach the _____ to the sum.

2. Law of adding UNLIKE SIGNS

- (1) Find the _____ between the _____.
- (2) Attach the sign of the _____ number to the _____.

B. Subtraction

1. _____ to addition.

2. The effect of the subtrahend is _____.

- (a) _____ subtrahend has a negative effect.
- (b) _____ subtrahend has a positive effect.

3. Law of subtracting signed numbers - _____ change the sign of the _____ and proceed, as

in _____.

III. Multiplication of signed numbers

A. Law of multiplying LIKE SIGNS.

1. Multiply the _____ to get the _____ product.

2. Sign of the product is _____ positive.

B. Law of multiplying UNLIKE SIGNS.

1. Multiply the _____ to get the _____ product.

2. Sign of the product is _____ negative.

NOTE: When multiplying more than _____ signed numbers, the _____ are multiplied in _____ until the final sign is determined.

IV. Division of signed numbers

A. Law of dividing LIKE SIGNS

1. Divide the _____ to get the _____ quotient.

2. Sign of the quotient is _____ positive.

B. Law of dividing UNLIKE SIGNS

1. Divide the _____ to get the _____ quotient.

2. Sign at the quotient is _____ negative.

V. Special cases involving signed numbers.

A. Subtraction.

Establishes the basis for the rule governing the removal of signs of grouping - signs of grouping preceded by a

_____ sign may be removed if the _____ of
all _____ within the grouping are _____.

B. Division in fractional form

1. Every fraction is said to have _____ signs.

(a) _____

(b) _____

(c) _____

2. Fractions with more than _____ negative sign
are reducible to a simpler form with _____ or
_____ negative sign.

3. The negative sign, in a fraction with only _____
negative sign, may be _____ to any other position
without changing the _____ of the fraction.

4. Law of signs for fractions - Any _____ of the
_____ signs in a fraction may be _____
without altering the _____ of the fraction.

VII. Algebraic Terminology and definitions

A. Algebra - form of _____ where _____
represents numbers.

B. Literal number - the _____ used in an _____
_____.

C. Algebraic expression/formula - _____ and _____ of
algebra representing one number or _____.

D. Terms of an algebraic expression/formula - the parts of the _____ that are connected by _____ and/or _____ signs. The term itself _____ contain a _____ or _____ sign.

1. _____ terms - contain the _____ literal numbers raised to the _____ power, and can be _____ algebraically (with due regard for _____).
2. _____ terms - contain _____ numbers, raised to a _____ power or _____ literal numbers, and can _____ be _____.

E. Types of Algebraic Expressions

1. _____ - contains one term.
2. _____ - contains two terms.
3. _____ - contains two or more terms.

F. Coefficient of a term - any _____ or group of _____ of a term by which the remainders of the _____ is to be _____.

1. _____ coefficient - the _____ of the term written in _____ numerals, normally written as the _____ factor.

NOTE: When _____ numerical coefficient is written, it is understood to be _____.

2. _____ coefficient - the _____ of the term written in _____ numbers in _____ order.

G. Symbols of grouping

1. Indicates _____ or _____ terms - that are to be _____ and _____ as _____ term.
 - a. _____ - most common.
 - b. _____
 - c. _____
2. Signify _____ of operation - (1) _____ (2) _____ (3) _____.

H. Exponents - represent how many _____ a quantity is _____ by itself.

I. Radical - _____ of exponents, must find the _____ of the number beside the _____, (what number _____ by _____) designated by the _____.

VII. Evaluating algebraic expressions which given numerical values.

A. Evaluate; $ax/b + y$, when $a=4$, $b=2$, $x=7$ and $y=5$.

B. Evaluate; $c + ay^2/b - 4a^2$, when $a=4$, $b=2$, $c=3$, $x=7$, and $y=5$.

NOTE: In _____ mathematical problem with _____ signs of operation, the order of operation is _____, _____, _____.

VIII. Evaluating operations involving monomials and/or polynomials

A. Addition or subtraction of monomials and/or polynomials
can only be done if _____
_____.

B. Multiplying:

1. Monomial x Monomial

2. Monomial x Polynomial

RULE: _____

3. Polynomial x Polynomial

RULE: _____

IX. Dividing

A. Monomial ÷ Monomial

B. Polynomial ÷ monomial

INFORMATION SHEET 2.4.1.I

ALGEBRAIC LAW/RULES OF OPERATION

INTRODUCTION:

In the study of signed numbers and basic algebra, there are certain rules or laws of operation that are always applied when evaluating expressions. This information sheet has been prepared to supply you with those laws.

REFERENCE:

NAVEDTRA 10069-D, Mathematics, Volume I.

INFORMATION:

I. Commutative Law (Order)

A. Addition-the sum of two or more addends is the same, regardless of the order they are added in.

Example: $a + b + c = c + a + b$
 $a - b - c = -c - a - b$

B. Multiplication-the product of two or more factors is the same, regardless of the order they are multiplied in.

Example: $abc = bca = cab$

II. Associative Law (Grouping)

A. Addition-the sum of three or more addends is the same regardless of the manner in which they are grouped.

Example: $a + b + c = a + (b + c) = (a + b) + c$

B. Multiplication-the product of three or more factors is the same regardless of the manner in which they are grouped.

Example: $abc = (ab)c = a(bc)$

III. Distributive Law

If the sum of two or more quantities is multiplied by a third quantity, the product is found by applying the multiplier to each of the original quantities separately, and summing the resulting expression. This also applies to division.

Example: $a(b + c) = ab + ac$
 $(a + b + c)/d = a/d + b/d + c/d$

IV. Combining terms

Only like terms can be combined. Numerical coefficients are additive.

$$\text{Example: } a + a^2 + 2a^2 = a + 3a^2$$

$$a + a^2 - 2a^2 = a - a^2$$

V. Removing signs of grouping

A. Preceded by a positive sign, remove signs of grouping without any changes.

$$\text{Example: } 2b + (a - c) = 2b + a - c$$

B. Preceded by a negative sign, remove signs of grouping by changing all of the signs of all the terms within the grouping.

$$\text{Example: } 2a - (-4x + 3by) = 2a + 4x - 3by$$

VI. Inserting signs of grouping

A. Signs of grouping preceded by a positive sign are inserted without any changes.

$$\text{Example: } 3x - 2y + 7x - y = (3x - 2y) + (7x - y)$$

B. Signs of grouping preceded by a negative sign are inserted by changing the signs of all the terms in the grouping.

$$\text{Example: } 3x - 2y + 7x - y = 3x - (2y - 7x + y)$$

VII. Exponents

A. Add/Subtract

Must be like terms

B. Numerical Coefficients are additive.

$$\text{Example: } a^2 + a^2 = 2a^2$$

$$b^2 + b = b^2 + b$$

VIII. Multiplication

literal numbers.

B. Literal number stays the same

Example: $3^2 \cdot 3^3 = 3^{2+3} = 3^5$ (NOT 9^5)

$$a^2 \cdot a^4 = a^{2+4} = a^6$$

IX. Division

Same rules as multiplication, except the exponents are SUBTRACTED.

Example: $2^4/2^2 = 2^{4-2} = 2^2$

$$b^3/b^4 = b^{3-4} = b^{-1} = 1/b$$

X. Radicals

A. Add/Subtract

Must be like terms, having the same index.
Numerical coefficients are additive.

Example: $3\sqrt{a} + 5\sqrt{a} = 8\sqrt{a}$
 $3\sqrt[3]{a} + 5\sqrt{a} = 3\sqrt[3]{a} + 5\sqrt{a}$

B. Multiplication

Numerical coefficients are multiplied together.
Radicals with the same index can be combined under one sign.

Example: $3\sqrt{a} \cdot 2\sqrt{a} = 6\sqrt{a \cdot a} = 6a$
 $2\sqrt{a} \cdot 5\sqrt{b} = 10\sqrt{ab}$

C. Division

Numerical coefficients are divided.
Radicals with the same index can be combined under one sign.

Example: $15\sqrt{a} / 3\sqrt{a} = 5\sqrt{a/a} = 5\sqrt{1} = 5 \cdot 1 = 5$
 $4\sqrt{a} / 2\sqrt{b} = 2\sqrt{a/b}$

ASSIGNMENT SHEET 2.4.1A

SIGNED NUMBERS

INTRODUCTION

The purpose of this assignment sheet is to supply the student with practice problems involving mathematical operations with signed numbers.

LESSON TOPIC LEARNING OBJECTIVES

2.4.1 SOLVE two given mathematical problems involving addition and subtraction of positive and negative numbers.

2.4.2 SOLVE given mathematical problems involving addition of positive (2) and negative (2) numbers.

STUDY ASSIGNMENT

Review Notetaking Sheet 2.4.1N and complete the study questions below.

STUDY QUESTIONS:

1. In the problems below solve by ADDING:

a. $+25$

+25

b. -78549

-47358

c. -42

+68

-21

d. $+25$

-20

+ 5

-75

+10

2. In the problems below solve by SUBTRACTING:

a. $+75$

+25

b. -783

+ 53

c. -684

-428

d. 765

576

3. MULTIPLY:

a. 35

x 5

b. 73

x -2

c. -585

x -12

d. -787

x 40

4. DIVIDE:

a. $270 \div 3 =$

b. $-483 \div 7 =$

c. $-360 \div 4 =$

d. $520 \div -5 =$

ASSIGNMENT SHEET 2.4.2A

BASIC ALGEBRA

INTRODUCTION

The purpose of this assignment sheet is to supply the student with practice questions and problems involving basic algebraic operations.

LESSON TOPIC LEARNING OBJECTIVES

- 2.4 SOLVE two given algebra problems involving basic algebra.
- 2.4.4 MATCH algebraic terminology, listed in column "A", to its definition, listed in column "B".
- 2.4.5 MATCH algebraic laws/rules of operation listed in column "A" to its correct example, listed in column "B".
- 2.4.6 Given numerical values for literal number, EVALUATE basic algebraic expressions.
- 2.4.7 EVALUATE algebraic expressions involving multiplication, division, addition, and subtraction of monomials and polynomials. Algebraic laws/rules of operation must be used

STUDY ASSIGNMENT

Review Notetaking Sheet 2.4.1N and Information Sheet 2.4.1I and complete the Study Questions below.

STUDY QUESTIONS:

- A. MATCH the definition in column "B" to the correct algebraic terminology in column "A"

A

____ 1. Literal Numbers
 ____ 2. Algebraic expression/
 formula
 ____ 3. Terms of an expres-
 sion/formula
 ____ 4. Coefficient of a
 term

B

a. Factor of a term by which the
 remainder of the term is to
 be multiplied.
 b. Does not contain a positive
 or negative sign.
 c. Signs and symbols of algebra
 representing one quantity.
 d. Represents how many times a
 quantity is multiplied by
 itself.
 e. Letters used in an
 expression.

B. MATCH the example in column "B" to the correct rule/law of
 operation it exemplifies in column "A".

A

____ 1. Commutative Law
 ____ 2. Associative Law
 ____ 3. Distributive Law
 ____ 4. Exponents

B

a. $b^2 + b^2 = 2b^2$; $b^2 - 2b^2 = -b^2$
 b. $a(b+c) = ab+ac$; $(b+c)/d = b/d + c/d$
 c. $a^2 \cdot a^2 = a^4$; $a^4 \div a^2 = a^2$
 d. $a+b+c = c+a+b$; $acb = bca = cab$
 e. $a+b+c = (c+a)+b$; $abd = (ad)b$

C. Evaluate the below expressions using the given values; $a = 2$,
 $b = 4$, $c = 5$.

1. $a - b - c =$

3. $(2c + 4b) + a =$

2. $2b - a =$

4. $3abc/2b =$

D. Evaluate the below expressions using algebraic rules/laws of
 operation.

ADD

1. $\frac{4ax}{3ax}$

2. $\frac{11b^3}{-16b^3}$
 $\underline{4b}$

3. $\frac{12abx^2}{4abx^2}$ - $\frac{4a^2b}{16a^2b}$
 $\underline{-12abx^2}$

SUBTRACT

5. $\frac{4ax}{3ax}$

6. $\frac{2a + 2b + 4x}{-4a - 3b - 4x}$

7. $\frac{24abc^2x}{-14abc^2x}$

MULTIPLY

8. $(4x^2)(-2x^3) =$

10. $(12c)(12b-4a) =$

9. $(a)(2-ab) =$

11. $(12x - 4y)(4x + 3y) =$

DIVIDE

12. $\frac{16xy^2}{2xy^2} =$

14. $\frac{15b - 15a}{3} =$

13. $\frac{-20a^4b^3c}{4a^4bc} =$

15. $\frac{24b^3 - 18b}{6b} =$

INFORMATION SHEET 3.0.1I

NAVAL/MARINE ORGANIZATION

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit III.

TERMINAL OBJECTIVE

3.0 DEMONSTRATE a knowledge of Navy and Marine Corps basic aviation organizational structure, titles, and responsibilities, by SELECTING or MATCHING the correct answers from lists provided.

ENABLING OBJECTIVES

- 3.1 MATCH each naval aviation (Group IX) rating, listed in column "A", with its job description, listed in column "B".
- 3.1.1 MATCH each naval aviation chain of command title, listed in column "A" with its squadron responsibilities, listed in column "B".
- 3.1.2 MATCH each division of a carrier, listed in column "A", with their responsibilities, listed in column "B".
- 3.1.3 MATCH each naval aviation chain of command title, listed in column "A", with its naval air station responsibilities, listed in column "B".
- 3.2 MATCH each of the Marine Corps' Military Occupational Speciality (MOS) fields, listed in column "A", with its occupation, listed in column "B".
- 3.2.1 MATCH each Marine Corps aviation chain of command title, listed in column "A", with its Marine Corps squadron responsibilities, listed in column "B".
- 3.2.2 MATCH each Marine Corps aviation chain of command title, listed in column "A", with its Marine Corps air station responsibilities, listed in column "B".
- 3.2.3 MATCH each Marine Corps aviation chain of command title, listed in column "A", with its Marine Corps carrier responsibilities, listed in column "B".

NAVAL AND MARINE AVIATION
ORGANIZATION

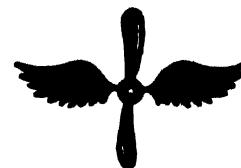
REFERENCES:

1. AIRMAN, NAVEDTRA 10307-E, Chapters 1 & 2
2. MOS MANUAL, MCOP 1200.7D, CH-9
- 3.

NOTETAKING OUTLINE:

I. Naval Aviation Group IV Specialty Marks.

A. _____



B. _____



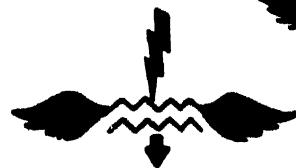
C. _____



D. _____



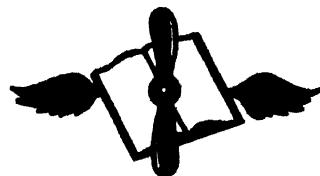
E. _____



F. _____



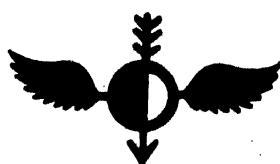
G. _____



H. _____



I. _____



J. _____



K. _____



L. _____



M. _____



N. _____



O. _____



P. _____



Q. _____



II. Marine Corps Military Occupational Specialty (MOS) Field.

A. 6011 - _____

B. 6300 - _____

C. 6500 - _____

D. 6071 - _____

E. 6081 - _____

F. 6091 - _____

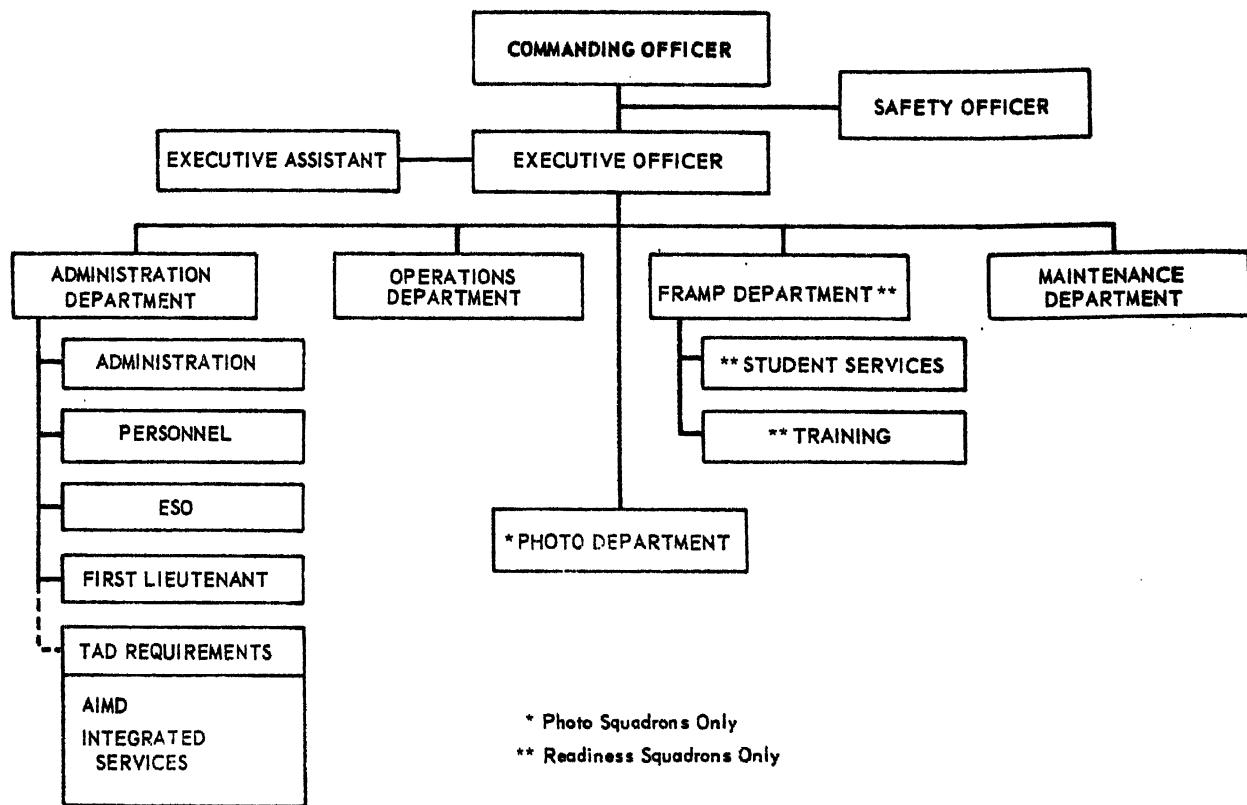
G. 6111 - _____

H. 6311 - _____

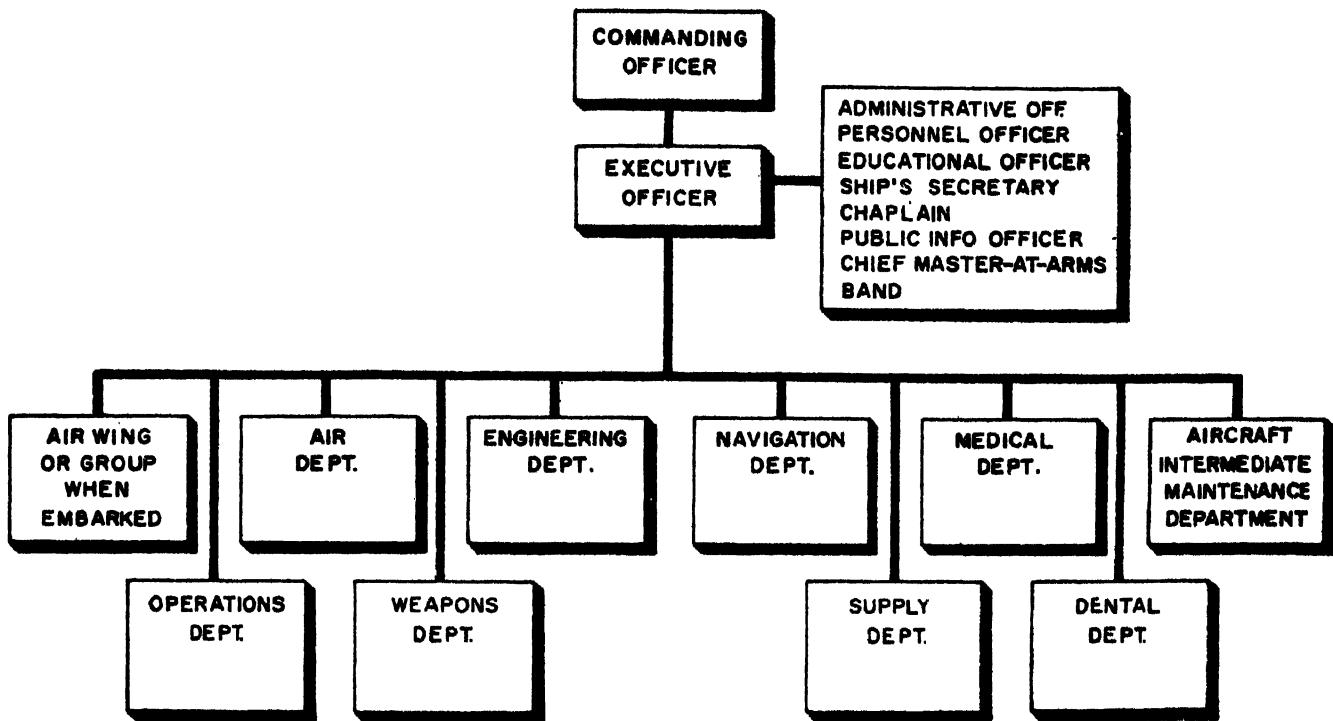
I. 6331 - _____

III. Naval Organization

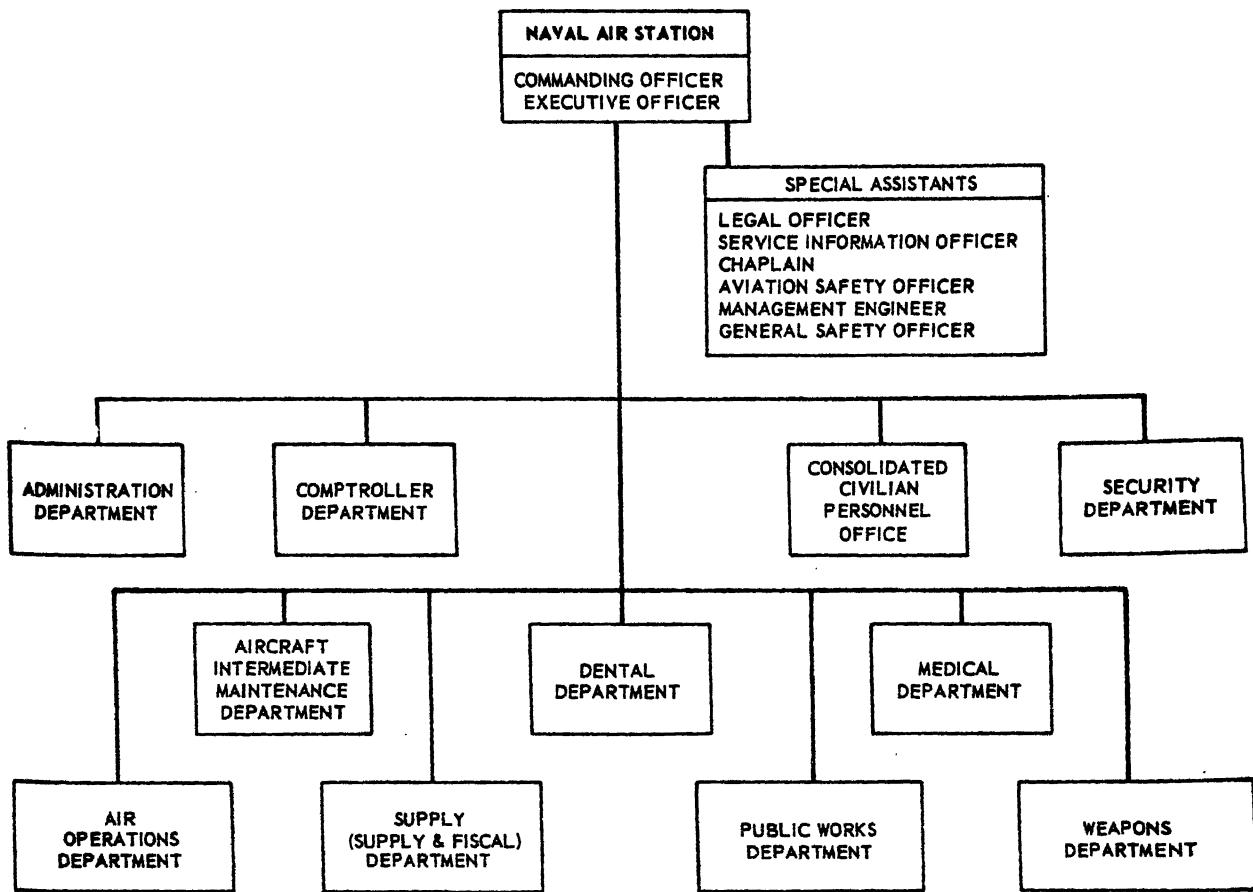
A. Squadron Organization



B. Carrier Organization



C. Naval Air Station Organization



IV. Marine Corps Organization

A. Marine Aircraft Squadrons consist of _____

B. The squadron Safety Officer works directly for the

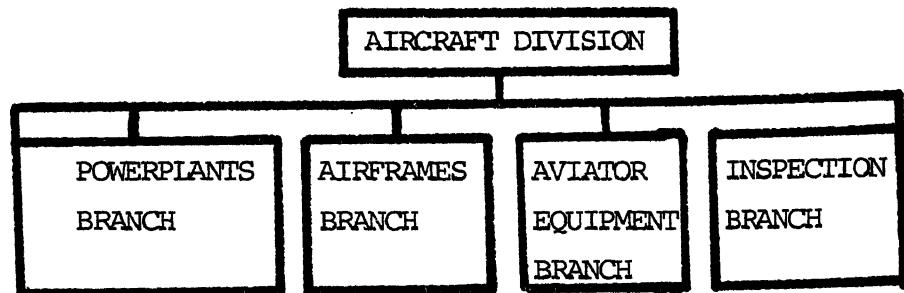
C. All Marine Aircraft Squadrons have at least _____
common departments.

1. Administrative _____
2. Intelligence _____
3. Operations _____
4. Logistics _____
5. Maintenance _____

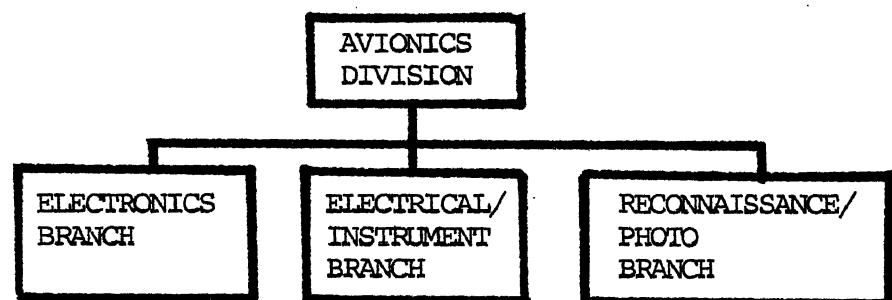
a. _____ non-production divisions and
_____ production divisions.

b. Production divisions

(1) Aircraft Division

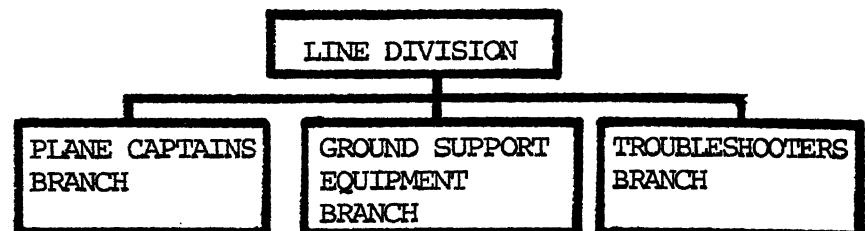


(2) Avionics Division



(3) Armament Division

(4) Line Division



INFORMATION SHEET 4.0.1I

BASIC AIRCRAFT SYSTEMS

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit IV.

TERMINAL OBJECTIVE

4.0 DEMONSTRATE a knowledge of aircraft systems and the aviation speciality responsible for each system's maintenance, by MATCHING or SELECTING the correct response from a given list.

ENABLING OBJECTIVES

4.1 SELECT, from a list provided, the aircraft system maintained by the Aviation Machinist's Mate (AD).

4.1.1 SELECT, from a list provided, the types of powerplants used in naval aircraft.

4.1.2 SELECT, from a list provided, the purpose of an aircraft fuel system.

4.1.3 SELECT, from a list provided, the purpose of an aircraft powerplant.

4.1.4 SELECT, from a list provided, the safety precautions to be observed during aircraft engine operation.

4.2 SELECT, from a list provided, the aircraft systems maintained by the Aviation Structural Mechanic, Safety Equipment (AME).

4.2.1 SELECT, from a list provided, the purpose of the aircraft pressurization and air-conditioning systems.

4.2.2 SELECT, from a list provided, the purpose of the aircraft oxygen system.

4.2.3 SELECT, from a list provided, the purpose of the aircraft egress system.

4.2.4 SELECT, from a list provided, the safety precautions to be observed when working with or around liquid oxygen.

4.3 SELECT, from a list provided, the aircraft systems maintained by the Aviation Structural Mechanic, Hydraulics (AMH).

4.3.1 SELECT, from a list provided, the purpose of an aircraft hydraulic system.

- 4.3.2 SELECT, from a list provided, the basic components of an aircraft pneumatic system.
- 4.3.3 SELECT, from a list provided, the purpose of an aircraft pneumatic system.
- 4.3.4 SELECT, from a list provided, the basic components of an aircraft pneumatic system.
- 4.3.5 SELECT, from a list provided, the safety precautions to be observed while working near aircraft hydraulic and pneumatic systems.
- 4.4 SELECT, from a list provided, the aircraft systems maintained by the Aviation Structural Mechanic, Structures (AMS).
- 4.4.1 SELECT, from a list provided, the purpose of the aircraft landing gear system.
- 4.4.2 SELECT, from a list provided, the principal structural units of an aircraft.
- 4.5 SELECT, from a list provided, the aircraft system maintained by the Aviation Electronics Technician (AT)
- 4.5.1 SELECT, from a list provided, the purpose of the aircraft radar system.
- 4.5.2 SELECT, from a list provided, the purpose(s) of the aircraft avionics system.
- 4.5.3 MATCH each anti-submarine warfare system, listed in column "A", with its description, listed in column "B".
- 4.5.4 MATCH each of the basic components of a communications system, listed in column "A", with its description, listed in column "B".
- 4.5.5 MATCH each of the navigational systems, listed in column "A", with its description, listed in column "B".
- 4.6 SELECT, from a list provided, the aircraft instrument systems maintained by the Aviation Electricians Mate (AE).
- 4.6.1 SELECT, from a list provided, two sources of electrical energy used in an aircraft.
- 4.6.2 SELECT, from a list provided, the purpose of an aircraft electrical system.
- 4.6.3 SELECT, from a list provided, the safety precautions to be observed when working with electrical or electronic equipment on aircraft.

4.7 SELECT, from a list provided, the aircraft systems maintained by the Aviation Ordnanceman (AO).

4.7.1 MATCH each aircraft weapon, listed in column "A", with its description, listed in column "B".

4.7.2 SELECT, from a list provided, the purpose of the aircraft armament system.

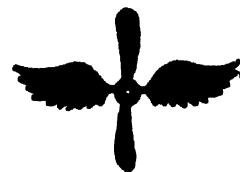
4.7.3 SELECT, from a list provided, the safety precautions to be observed when working with or around aviation ordnance.

NOTETAKING SHEET 4.1.1N

POWERPLANTS

REFERENCES:

NAVEDTRA 10307-E, Airman, pages 10, 86-118



NOTETAKING OUTLINE

I. Systems maintained by the Aviation Machinist Mate (AD).

A. *Comparison of the effect of the different treatments on the growth of the plants*

B. *What is the relationship between the two variables?*

c. *What is the relationship between the two concepts of the self?*

II. Types of powerplants used in naval aircraft

A. *Comparison of the effect of the different treatments on the growth of the plants*

B. _____

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III. Aircraft Fuel System

A.

B. _____

IV. Purpose of a powerplant

A. *Comparison of the effect of the different treatments on the growth of the plants*

B. _____

V. Safety Precautions

A. _____

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B. *Explain the meaning of the following terms in the context of the study of the environment.*

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c. _____

NOTETAKING SHEET 4.2.1N

EGRESS/ENVIRONMENTAL CONTROL

REFERENCES:

NAVEDTRA 10307E, AIRMAN, Pages 11, 191--193



NOTETAKING OUTLINE

I. Systems maintained by the Aviation Structural Mechanic, Safety Equipment (AME).

- A. _____
- B. _____
- C. _____
- D. _____

II. Purpose of Pressurization and Air Conditioning Systems.

- A. _____
- B. _____
- C. _____

III. Purpose of an Aircraft Oxygen System.

- A. _____
- B. Two Types
 - 1. _____
 - 2. _____

IV. Purpose of the Egress System.

- A. _____
- B. Safety Precautions
 - 1. _____
 - 2. _____
 - 3. _____

V. Safety Precautions when handling or around LOX.

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____

NOTETAKING SHEET 4.3.1N

AVIATION STRUCTURAL MECHANIC,
HYDRAULICS

REFERENCE:

VEDTRA 10307-E, Airman, Chapter 4, pages 82-85

NOTETAKING OUTLINE



Systems maintained by the Aviation Structural Mechanic,
Hydraulics (AMH)

- A. _____
- B. _____
- C. _____
- Purpose of an Aircraft hydraulic system
 - A. _____
 - B. _____
- I. Basic components of an aircraft hydraulic system
 - A. _____
 - B. _____
 - C. _____
 - D. _____
- Purpose of an aircraft pneumatic system
 - A. _____
 - B. _____
- Basic components of an aircraft pneumatic system
 - A. _____ - _____
 - B. _____ - _____
 - C. _____ - _____

NOTETAKING SHEET 4.4.1N

AIRFRAMES

REFERENCES:

NAVEDTRA 10307-E, Airman, Chapter 4, pages 71-81

NOTETAKING OUTLINE



I. Systems maintained by the Aviation Structural Mechanic Structures (AMS).

- A. _____
- B. _____
- C. _____

II. Purpose of the Landing Gear System

- A. _____
- B. _____
- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____

III. Principle structural units of an aircraft

A. Fuselage -

- 1. _____
- 2. _____
- 3. _____

B. Wings -

- 1. _____
- 2. _____

C. Control Surfaces

1. _____
2. _____

D. Landing Gear

1. _____
2. _____
3. _____

NOTETAKING SHEET 4.5.1N

AVIONICS SYSTEM

REFERENCES:

NAVEDTRA 10307-E, Airman, Chapters 7 & 8, pages 141-159

NOTETAKING OUTLINE

I. Avionics is the abbreviation for _____.

A. Encompasses _____ different ratings

B. Maintains _____ separate systems.

1. _____

2. _____

3. _____

4. _____



II. Systems maintained by the AT - _____

III. Purpose of the Avionics System - _____

IV. Purpose of the Aircraft Radar System



A. Maintained by _____

B. Purpose - _____

C. Six basic components

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

V. Anti-Submarine Warfare System

A. Maintained and operated by _____ individual ratings

1. _____

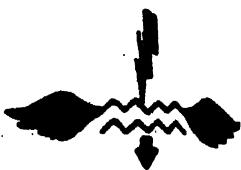
2. _____

B. Anti-Submarine Warfare System

1. Sonar - _____

2. Sonobouy - _____

3. MAD - _____



VI. Communications Components - _____ basic components

A. _____

B. _____

C. _____

D. _____

VII. Navigational Aids - determine the _____ and/or _____
to/from geographical points or radio stations

A. ADF - _____

B. VOR - VHF _____

C. TACAN - _____

D. LORAN - _____

E. INS - _____

NOTETAKING SHEET 4.6.1N

ELECTRICAL SYSTEMS

REFERENCES:

NAVEDTRA 10307-E, Airman, Chapters 7 & 8.



NOTETAKING OUTLINE

I. Systems maintained by the Aviation Electricians Mate (AE)

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____

II. _____ Sources of electrical energy in an aircraft

- A. _____
- _____
- _____
- _____
- B. _____
- _____
- _____
- _____

III. Purpose of an Aircraft Electrical System

- _____
- _____
- _____
- _____

IV. Safety Precautions

- A. _____
- B. _____

C. _____

D. _____

E. _____

F. _____

NOTETAKING SHEET 4.7.1N
AVIATION ORDNANCE

REFERENCES:

NAVEDTRA 10307-E, Airman, Chapter 3



NOTETAKING OUTLINE:

I. Systems maintained by the Aviation Ordnanceman (AO)

A. _____

B. _____

II. Aircraft weapons and description

A. M61A1 20mm Automatic Gun

B. Sparrow Missile

C. Sidewinder Missile

D. Phoenix Missile

III. Purpose of the armament system - _____

IV. Safety Precautions:

- A. _____
- B. _____
- C. _____
- D. _____

INFORMATION SHEET 5.0.1I

NAVAL AVIATION MAINTENANCE PROGRAM

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit V.

TERMINAL OBJECTIVE

5.0. DOCUMENT simulated maintenance situations by completing selected blocks of Visual Information Display System/Maintenance Action Form (VIDS/MAF) and Support Action Form (SAF), utilizing the Maintenance Instruction Manual (MIM), Illustrated Parts Breakdown Manual (IPB), Work Unit Code Manual (WUC), blank VIDS/MAF and SAF provided.

ENABLING OBJECTIVES

- 5.1 MATCH each technical manual listed in column "A", with its technical manual number, listed in column "B".
- 5.1.1 MATCH the aircraft systems components, listed in column "A", with their correct pressure or capacity, listed in column "B", utilizing the NA 01-40AVC-2-2.
- 5.1.2 SELECT, from a list provided, what Part I of a technical manual number indicates.
- 5.1.3 SELECT, from a list provided, what Part II of a technical manual number indicates.
- 5.1.4 SELECT, from a list provided, what Part III and Part IV of a technical manual number indicates.
- 5.1.5 SELECT, from a list provided, the purpose of the Maintenance Instruction Manual (MIM).
- 5.1.6 SELECT, from a given list, the purpose of the Illustrated Parts Breakdown Manual (IPB).
- 5.1.7 MATCH the aircraft part numbers, listed in column "A", with its part name, listed in column "B", utilizing the NA 01-40AVC-4-2.
- 5.1.8 MATCH each aircraft component, listed in column "A", with its part number, listed in column "B", utilizing the NA 01-40AVC-4-2.
- 5.1.9 SELECT, from a list provided, the purpose of the Work Unit Code Manual (WUC).

- 5.1.10 MATCH each "malfunction description", listed in column "A", with its malfunction code number, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.11 MATCH each part of a "work unit code", listed in column "A", with the type of information each part represents, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.12 MATCH each "when discovered code", listed in column "A", with its description, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.13 MATCH each "support action code", listed in column "A", with its description, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.14 MATCH each "type maintenance code", listed in column "A", with its description, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.15 MATCH each "action taken code", listed in column "A" with its description, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.16 MATCH each "work unit code", listed in column "A" with its system or component, listed in column "B", utilizing the Work Unit Code Manual.
- 5.2 SELECT, from a list provided, the purpose of the three level maintenance concept.
- 5.2.1 MATCH each level of maintenance, listed in column "A", with the task performed at that level, listed in column "B".
- 5.2.2 SELECT, from a list provided, the purpose of the Planned Maintenance System (PMS).
- 5.2.3 MATCH each type of aircraft inspection, listed in column "A", with its correct definition, listed in column "B".
- 5.2.4 SELECT, from a list provided, the purpose of the Maintenance Requirement Card (MRC).
- 5.2.5 SELECT, from a list provided, the information contained on the Maintenance Requirement Card (MRC).
- 5.2.6 SELECT, from a list provided, the purpose of the Sequence Control Chart (SSC).
- 5.3 SELECT, from a list provided, the purpose of the Maintenance Data System (MDS).
- 5.3.1 SELECT, from a list provided, the documents used to collect maintenance data.

5.3.2 SELECT, from a list provided, categories of data collected for the Maintenance Data System (MDS).

5.3.3 SELECT, from a list provided, the purpose of the Subsystem Capability Impact Reporting (SCIR) System.

5.4 SELECT, from a list provided, the purpose of the Visual Information Display System/Maintenance Action Form (VIDS/MAF).

5.4.1 MATCH each of the VIDS/MAF block titles, listed in column "A", with the information to be recorded in each block, listed in column "B".

5.4.2 COMPLETE selected blocks of a VIDS/MAF, utilizing a simulated maintenance situation and VIDS/MAF provided.

5.4.3 MATCH a list of codes, from a Work Unit Code Manual, listed in column "A", with the appropriate VIDS/MAF block, listed in column "B".

5.4.4 SELECT, from a list provided, those parts of a VIDS/MAF that are used by the work center.

5.4.5 SELECT, from a list provided, those maintenance actions which are documented on the VIDS/MAF.

5.4.6 SELECT, from a list provided, the purpose of the Support Action Form (SAF).

5.4.7 MATCH each of the SAF block titles, listed in column "A", with its appropriate code, listed in column "B".

5.4.8 MATCH each of the SAF block titles, listed in column "A", with the information to be recorded in each block, listed in column "B".

5.4.9 SELECT, from a list provided the definition of the Support Action Form (SAF).

5.4.10 SELECT, from examples provided, for a given maintenance situation, the correctly documented Support Action Form (SAF).

5.4.11 COMPLETE selected blocks of a SAF card, utilizing a simulated maintenance situation, SAF card and Work Unit Code Manual provided.

NOTETAKING SHEET 5.1.1N

TECHNICAL MANUALS

REFERENCES :

NAVAL AVIATION MAINTENANCE PROGRAM, OPNAVINST 4790.2B

NOTETAKING OUTLINE :

I. Technical Manual Identification

A. Purpose of technical manuals - _____

B. Part I - _____

1. 00 - _____
2. 01 - _____
3. 02 - _____
4. 03 - _____

C. Part II - _____

D. Part III - _____

1. (-1) - _____
2. (-2) - _____
3. (-3) - _____
4. (-4) - _____

E. Part IV - _____

Types of Manuals

A. Maintenance Instruction Manual (MIMS) - _____

B. Illustrated Parts Breakdown (IPB) - _____

C. Work Unit Code Manual (WUC)

1. _____

2. _____

3. _____

4. _____

a. _____
(1) _____
(2) _____

b. _____
(1) _____
(2) _____
(3) _____
(4) _____

c. _____
(1) _____
(2) _____

d. _____

(1) _____

(2) _____

e. _____

(1) _____

(2) _____

f. _____

(1) _____

(2) _____

g. _____

(1) _____

(2) _____

(3) _____

(4) _____

h. _____

(1) _____

(2) _____

ASSIGNMENT SHEET 5.1.1A

TECHNICAL MANUALS

INTRODUCTION:

The purpose of this assignment sheet is to provide the student with basic information of technical manuals. It is important to first know and understand manual numbering, and how to properly use technical manuals.

LESSON TOPIC OBJECTIVES:

- 5.1 MATCH each technical manual listed in column "A" with its technical manual number listed in column "B".
- 5.1.1 MATCH the aircraft systems components listed in column "A" with their correct pressure or capacity, listed in column "B", utilizing the NA 01-40AVC-2-2.
- 5.1.2 SELECT, from a list provided, what part I of a technical manual number indicates.
- 5.1.3 SELECT, from a list provided, what part II of a technical manual number indicates.
- 5.1.4 SELECT, from a list provided, what part III and part IV of a technical manual indicates.
- 5.1.5 SELECT from a list provided the purpose of the Maintenance Instruction Manual (MIM).
- 5.1.6 SELECT from a given list, the purpose of the Illustrated Parts Breakdown Manual (IPB).
- 5.1.7 MATCH the aircraft part numbers, listed in column "A" with its part name, listed in column "B", utilizing the NA 01-40ABC-4-2.
- 5.1.8 MATCH each aircraft component, listed in column "A" with its part number, listed in column "B", utilizing the NA 01-40AVC-4-2.
- 5.1.9 SELECT, from a list provided, the purpose of the Work Unit Code Manual (WUC).
- 5.1.10 MATCH each "Malfunction Description", listed in column "A", with its malfunction code number, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.11 MATCH each part of a "Work Unit Code", listed in column "A", with the type of information each part represents, listed in column "B", utilizing the Work Unit Code Manual.

- 5.1.12 MATCH each "when discovered code", listed in column "A" with its description, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.13 MATCH each "type maintenance code", listed in column "A", with its description, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.14 MATCH each support action code, listed in column "A", with its description, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.15 MATCH each "action taken code", listed in column "A" with its description, listed in column "B", utilizing the Work Unit Code Manual.
- 5.1.16 MATCH each "work unit code, listed in column "A", with its system or component, listed in column "B", utilizing the Work Unit Code Manual.

WORK ASSIGNMENT:

Complete questions (1) through (18) using publications, NA 01-40AVC-2, NA 01-40AVC-4, and NA 01-40AVC-8.

STUDY QUESTIONS:

1. All technical manuals pertaining to aircraft, which are used by the Navy, are under the responsibility of _____.
2. Select, from the following list, the reason for the proper use of NAVAIR technical manuals.
 - a. Proper use provides information necessary to operate systems and equipment efficiently and uniformly throughout the Navy.
 - b. Proper use provides the information necessary to operate systems and equipment in all types of weather.
 - c. Proper use provides the information necessary for the naval air systems command to maintain uniformity throughout their offices.

3. Match each technical manual listed in column "A" with its technical manual number listed in column "B"

<u>A</u>	<u>B</u>	
(1) Structural Repair Manual	NA 01-40AVC-8	_____
(2) Illustrated Parts Breakdown Manual	NA 01-40AVC-2	_____
(3) Maintenance Instruction Manual	NA 01-40AVC-1	_____
(4) Work Unit Code Manual	NA 01-40AVC-3	_____
(5) Flight Manual (NATOPS)	NA 01-40AVC-4	_____

4. Match each of the codes used in part I of a publication number listed in column "A" with the general subject classification represented, listed in column "B".

<u>A</u>	<u>B</u>
_____ (1) 00	a. Accessories
_____ (2) 01	b. General
_____ (3) 02	c. Aircraft
_____ (4) 03	d. Powerplants

5. Select, from the following list, the information indicated by part II of a technical manual publication number.

- a. Manufacturer, type, and model
- b. Type and model only
- c. Volume

6. Select, from the following list, the information indicated by part III and part IV of a publication number.

- a. Manufacturer and model
- b. Specific manual and volume
- c. Model and volume

7. Select, from the given list, the purpose of the Maintenance Instruction Manual (MIM).

- To provide all information necessary to perform structural repair.
- To provide general instructions required to perform scheduled maintenance.
- To provide the general and specific instructions required to perform routine maintenance on aircraft, systems, and equipment.

8. Select, from the following list, the purpose of the Illustrated Parts Breakdown Technical Manual (IPB).

- Used in assembling components
- Used in servicing aircraft
- Used in identifying and ordering parts

9. Match each of the part numbers, listed in column "A", with the correct part name/description, listed in column "B".

<u>A</u>	<u>B</u>
<u> </u> (1) 28B139-1	a. Fuel Booster Pump
<u> </u> (2) MS-29512-20	b. Gasket
	c. Generator Assy, AC
10. Match the aircraft components in column "A" with the correct part numbers, figure numbers, and index numbers in column "B".	
<u> </u> (1) Valve, Fuel	a. 20B56-(), FIG 71, INDEX 42
<u> </u> (2) Regulator Assy, Voltage	b. 3164-1A60, FIG 10, INDEX 48
<u> </u> (3) Switch, Fuel Pressure	c. KD100B-D, FIG 10, INDEX 59

11. Match each of the aircraft part names, listed in column "A", with its correct pressures/capacities, listed in column "B".

<u>A</u>	<u>B</u>
____ (1) External Fuel Tank, Aero ID	a. 160 PSI
____ (2) Nose Gear Tire, Land Based A-4 aircraft	b. 230 Gals
____ (3) Hydraulic Brake Reservoir	c. 1.04 Qts U.S.
____ (4) Fuselage Fuel Cell, Presure Fueling	d. 295 Gals
____ (5) Fuselage Fuel Cell, Gravity Fueling	e. 237 Gals
	f. 2.5 Qts U.S.

12. Match the malfunction descriptions and malfunction description code numbers listed in column "A" with their corresponding malfunction descriptions and malfunctions description code numbers listed in column "B".

<u>A</u>	<u>B</u>
____ (1) (622)	a. 520
____ (2) (Pitted)	b. Open
____ (3) (450)	c. Wet
____ (4) (BENT)	d. 780

13. Match the when discovered codes listed in column "A" with the descriptions listed in column "B".

<u>A</u>	<u>B</u>
____ (1) H	a. Conditional inspection
____ (2) Q	b. Calendar even inspection
____ (3) N	c. Special inspection
____ (4) L	d. Between flights-ground crew

14. Match the action taken codes listed in column "A" with their descriptions listed in column "B".

<u>A</u>	<u>B</u>
_____(1) 4	a. Work stoppage-awaiting parts
_____(2) L	b. BMC - lack of parts
_____(3) Z	c. Remove and reinstall
_____(4) S	d. Corrosion treatment

15. Match the support action codes listed in column "A" with their descriptions listed in column "B".

<u>A</u>	<u>B</u>
_____(1) 020	a. Engine QEC buildup
_____(2) 042	b. Powerplants
_____(3) 049	c. Cleaning/Depreservation
_____(4) 060	d. Preservation

16. Match the type maintenance codes listed in column "A" with their definitions listed in column "B".

<u>A</u>	<u>B</u>
_____(1) S	a. Daily inspection
_____(2) L	b. Conditional inspection
_____(3) Q	c. Local Manufacture
_____(4) D	d. Calendar even inspection

17. Match the parts of the work unit code number 12345 listed in column "A" with their definitions listed in column "B".

_____(1) 1 and 2	a. End Item
_____(2) 3	b. Sub-system
_____(3) 4	c. System
_____(4) 5	d. Component

18. Match the work unit codes listed in column "A" with the systems/components listed in column "B".

A

- (1) 1321D
- (2) 44210
- (3) 56860
- (4) 51310

B

- a. Interior lights
- b. Angle of attack system
- c. NLG axle
- d. Navigational indicators

INFORMATION SHEET 5.2.1I

PLANNED MAINTENANCE SYSTEM

INTRODUCTION:

The Naval Aviation Maintenance Program provides aircraft, which are subject to a variety of stresses, strains, vibrations, and environments, with a planned and controlled preventative maintenance program. During scheduled inspections, discrepancies are corrected and timely lubrications are performed. This Planned Maintenance System provides Maintenance Requirement Cards for each aircraft with the information required by the workers to accomplish those inspections.

REFERENCE:

OPNAVINST 4790.2B

INFORMATION:

The Naval Aviation Maintenance Program (NAMP) is founded upon the three-level maintenance concept. This concept is designed to provide for optimum utilization of manpower, facilities, material, and funds. It provides the basis for the establishment of standard organizations, procedures, forms, reports, work center codes, documents, and the responsibilities for the accomplishment of all maintenance on naval aircraft, associated material, and equipment.

The three levels of maintenance are the organizational, the intermediate level, and the depot level. Organizational maintenance is the type of work normally performed by the operating squadron's maintenance department on a day-to-day basis in support of its own operations. Organization level functions generally can be grouped as equipment inspections, servicing, handling, and "on-equipment" corrective and preventive maintenance. This includes on-equipment repair or removal and replacement of defective parts and components.

Intermediate maintenance is that type of work performed in centrally located facilities for the support of organizational activities. It is a department of Naval Air Stations, and CV/LPH/LHA type ships. This department is the Aircraft Intermediate Maintenance Department (AIMD). In the Marine Corps, it is a department of Marine Headquarters and Maintenance Squadrons (H&MS). Its phases of maintenance normally consist of calibration; off-equipment check, test, repair, or replacement of aeronautical components/equipment, and related support equipment. This level includes processing of aircraft components/equipment from stricken aircraft and incorporation of designated technical directives.

Depot maintenance is that type of work normally accomplished in an industrial type facility (Naval Air Rework Facilities or contractor's plants). This level of maintenance includes major overhaul or a complete rebuilding of components and assemblies, including the manufacture of parts, modifications, and testing as required. Depot maintenance serves to support lower levels of maintenance by providing engineering assistance and performing that maintenance beyond the capability of the lower level activities.

The Planned Maintenance System (PMS), properly conducted, ensures that all aeronautical equipment receives the necessary servicing, preventive maintenance, and inspections that are required. This facilitates the scheduling and controlling of maintenance operations with an effective quality assurance program.

The planned maintenance system has, within it, provisions for various types of aircraft inspections.

The turnaround inspection is conducted between flights to ensure the integrity of the aircraft for flight, verify proper servicing, and to detect degradation that may have occurred during the previous flight. The turnaround inspection may be considered valid for a period of 24 hours provided that no flight and no maintenance other than servicing occurs during this period.

The preflight inspection is conducted prior to each flight to ensure the integrity of the aircraft for flight and to verify proper servicing. It is considered valid for a period of 24 hours, provided no flights and no maintenance other than servicing occurs during this period.

The postflight inspection is conducted after each flight to detect degradation or damage that may have occurred during the flight and to determine the need for servicing.

Daily inspections are provided to inspect aircraft to a greater depth than either the turnaround or the preflight inspection. The daily inspection is performed prior to the first flight of the day and may be considered valid for a period of 72 hours, provided that no flight occurs during this period and that no maintenance other than routine servicing has been performed. The aircraft may be launched many times without another daily inspection providing it is within the 24-hour period of the last preflight inspection.

A special inspection is a scheduled inspection with a prescribed interval other than daily or calendar/phased. The intervals are specified in the maintenance requirement cards and are normally based on either the number of flight hours or on the number of days (7, 28, 35, etc.).

Conditional inspections are unscheduled inspections required as a result of a specific overlimit condition. This includes hard/overweight landings, engine overtemp/overboost, etc. These inspections require log book entries.

Calendar inspection requirements provide a detailed, searching inspection for material degradation that may have occurred during the preceding calendar interval and provide an opportunity to perform essential preventive maintenance.

Aircraft not on the calendar system use the phased maintenance concept which divides the total scheduled maintenance requirements into small packages (phases) of approximately the same work content that are accomplished sequentially at specified intervals. Completion of all required phases at their specified interval completes the phases inspection cycle. The cycle is repetitive for the service life of the aircraft and is not interrupted during standard depot level maintenance.

An acceptance inspection is performed at the time a reporting custodian accepts a newly assigned aircraft and upon receipt of an aircraft returned from standard depot level maintenance. It includes an inventory of all equipment listed in the inventory log, a configuration verification, a full systems functional test flight, functional test of appropriate emergency systems, and a daily inspection as required by the applicable maintenance requirement cards.

A transfer inspection is performed at the time a reporting custodian transfers an aircraft. It includes an inventory of all equipment listed in the inventory log, verification of the configuration, and a daily inspection as required by the applicable maintenance requirement cards.

Functional test flights are required following acceptance inspections, calendar inspections, and anytime it is not possible to determine the proper operation of a component by ground checks. These components include engines, propellers, movable flight surfaces, rotary wings, etc. Functional test flights shall be conducted with the minimum qualified flight crew necessary to ensure the proper operation of all required equipment.

Maintenance Requirement Cards (MRC's) provide a ready reference for use by maintenance personnel when performing scheduled maintenance tasks. Each MRC contains the tasks relating to a logical sequence for accomplishment. The maintenance requirement cards identify the recommended rating/MOS, performance interval and the work area/zone involved. A listing is provided which identifies support equipment, consumables, replacement parts, and assistance requirements for task performance. Illustration, clearances, tolerances, charts, part numbers, and other pertinent information are included where necessary.

If the improper performance of a maintenance task could result in a safety related equipment malfunction or jeopardize personnel, the letters "QA" (Quality Assurance) will appear on the appropriate maintenance requirement card.

If "QA" appears on the MRC, maintenance personnel must notify the Quality Assurance Representative to ensure that a properly performed task is accomplished.

When performing a calendar or phased-maintenance inspection, sequence control charts/cards (SCC's) aid in the planning and in the accomplishment of scheduled and unscheduled maintenance tasks during inspections. Sequence control charts/cards provide a means of controlling the assignment of work and personnel. Sequence control charts/cards indicate which MRC's are to be complied with, the numbers and specialities of personnel required, and the times during which the separate jobs are scheduled for completion.

PREFLIGHT/DAILY/TURNAROUND/POSTFLIGHT MAINTENANCE RECORD

1. <input type="checkbox"/> PREFLIGHT	<input type="checkbox"/> DAILY	<input type="checkbox"/> TURNAROUND	<input type="checkbox"/> POSTFLIGHT	
2. DATE _____ TIME STARTED _____ TIME COMPLETED _____	3. T/M/S	4. BU/NO	5. SIDE NO.	6. ACTIVITY
7. CARD NUMBER(S)	8. DISCREPANCY/JCN	9. CORRECTED		10. SIGNATURE AND RATE*
		YES	NO	

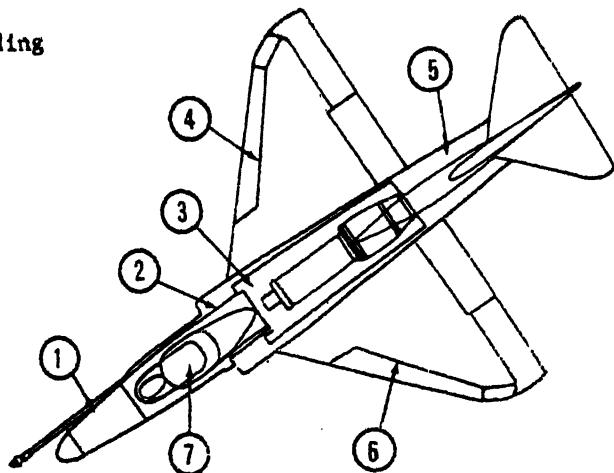
SAMPLE

***SIGNATURES CERTIFY THAT MRCs HAVE BEEN COMPLIED WITH, VIDS/MAFS HAVE BEEN INITIATED FOR DISCREPANCIES NOT CORRECTED, AND ALL TOOLS ARE ACCOUNTED FOR.**

11. MAINTENANCE CONTROL REPRESENTATIVE SIGNATURE AND RATE

WORK AREA

1. Radome, Nose Section
2. Forward Fuselage and Nose Landing Gear
3. Engine Compartment
4. RH Wing and Main Landing Gear
5. Aft Fuselage and Empennage
6. LH Wing and Main Landing Gear
7. Cockpit



CARD 1x	PUBLICATION NUMBER NAVAIR 01-40AVC-6-1		CARD SET DATE 1 May 1973	CHANGE NO.
---------	---	--	-----------------------------	------------

CARD 16	TIME 00:10	RTG. PC NO. 1	SERVICING	PROBE PRESSURE FUELING	ELEC PWR
					HYD PWR
TASK MIN.	WORK AREA	MOS. 6012 NO. 1	PUBLICATION NUMBER NAVAIR 01-40AVC-6-1	CARD SET DATE 1 May 1973	CHANGE NO.

			Assisted by PC-2 (10.0 M)		
			SPECIAL TOOLS/EQUIPMENT		
			Power Source, Electric Adapter, Ground Fueling	Model 1-356-1	
			CONSUMABLES/REPLACEMENT PARTS		
			Fuel, Turbine Aviation	MIL-T-5624 Grade JP-5	
10.0	2,3,4, 5,6,7	1.	Pressure fueling through air refueling probe: a. electrostatically ground pressure fueling equipment to ground connection. b. install adapter on air refueling probe and connect pressure fueling nozzle. c. fuel transfer bypass switch OFF. d. open access door 80 and insure internal pressure fueling check switch on fueling panel in ON position. e. position drop tank fueling switch to ON position (if installed). f. connect external electrical power source to aircraft and turn AC power switch ON.		

MAINTENANCE REQUIREMENT CARD

NOTETAKING SHEET 5.2.1N

PLANNED MAINTENANCE SYSTEM (PMS)

REFERENCE:

NAVAL AVIATION MAINTENANCE PROGRAM, OPNAVINST 4790.2B

NOTETAKING OUTLINE:

I. The three levels of NAMP

A. Organizational

1. _____

2. _____

3. Organizational function can be grouped as:

a. _____

b. _____

c. _____

d. _____

B. Intermediate

1. _____

2. _____

3. Intermediate Maintenance Activities (IMA) perform tasks to complete and sophisticated for Organizational Activities.

a. _____

b. _____

c. _____

C. Depot

1. _____

2. Depot level functions are intense and complete.

- a. _____
- _____
- b. _____
- _____
- c. _____
- _____

II. Purpose of the Planned Maintenance System (PMS)

A. Various types of inspections are incorporated in the PMS ensuring that each aircraft is properly cared for and looked after.

- 1. _____
- a. _____
- _____
- b. _____
- _____
- c. _____
- _____
- d. _____
- _____
- e. _____
- _____
- 2. _____
- a. _____
- _____
- b. _____
- _____
- c. _____
- _____
- d. _____
- _____
- 3. _____
- a. _____
- _____
- b. _____
- _____
- c. _____
- _____

NOTE:

- _____
- _____

4. _____

a. _____

b. _____

c. _____

5. _____

a. _____

b. _____

6. _____

a. _____

b. _____

7. _____

a. _____

b. _____

c. _____

d. Calendar inspections are programmed in multiples of calendar weeks.

(1) _____

(2) _____

(2) _____

(3) _____

8. _____

a. _____

b. _____

c. _____

d. _____

Phase inspections are identified by alphabetical characters

(1) _____

(2) _____

9. _____

a. _____

b. _____

c. _____

d. _____

10. _____

a. _____

b. _____

c. _____

III. Sequence control charts/cards aid in the planning and accomplishment of:

A. Scheduled and unscheduled maintenance tasks, and provide a means of controlling the assignment of work and personnel.

B. _____

C. _____

D. _____

E. _____

F. _____

IV. Maintenance Requirements Cards provide the instructions required for efficient performance of scheduled maintenance tasks.

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____

I. _____

ASSIGNMENT SHEET 5.2.1A
PLANNED MAINTENANCE SYSTEM (PMS)

INTRODUCTION:

The purpose of this assignment sheet is to provide the student with basic information of the Navy's planned maintenance system. It is important to first know and understand the planned maintenance system and proper use of MRC's and sequence control charts/cards.

LESSON TOPIC LEARNING OBJECTIVES:

- 5.2 SELECT, from a list provided, the purpose of the three level maintenance concept.
- 5.2.1 MATCH each level of maintenance listed in column "A" with the task performed at that level listed in column "B".
- 5.2.2 SELECT from a list provided, the purpose of the planned maintenance system.
- 5.2.3 MATCH each type of aircraft inspections, listed in column "A" with its correct definition, listed in column "B".
- 5.2.4 SELECT from a list provided, the purpose of the maintenance requirements card (MRC).
- 5.2.5 SELECT from a list provided, the information contained on the maintenance requirements card (MRC).
- 5.2.6 SELECT from a list provided, the purpose of the sequence control chart.

STUDY ASSIGNMENT:

Read Information Sheet 5.2.1I. Then answer questions (1) through (7).

STUDY QUESTIONS:

1. SELECT, from the following list, the designed purpose of the three level maintenance concept.
 - a. To provide for minimum usage of manpower, facilities, and materials.
 - b. To provide for optimum usage of manpower, facilities, materials, and funds.

c. To provide for minimum usage of manpower, facilities, materials and funds.

2. Match each level of maintenance listed in column "A", with the tasks performed at that level listed in column "B".

<u>A</u>	<u>B</u>
_____ (1) Organizational	a. Work performed in support of organizational activity
_____ (2) Intermediate	b. Industrial type maintenance
_____ (3) Depot	c. Operating squadron maintenance department performs

3. Select, from the following list, the purpose of the planned maintenance system.

- To ensure all aeronautical equipment receives the necessary servicing, preventive maintenance, and inspections that are required.
- To ensure that the manufacture of parts is performed at the appropriate maintenance level.
- To monitor the analysis of all phases of maintenance.

4. Select, from the following list, the purpose of the maintenance requirements cards.

- To provide the material department with inventory data.
- To provide a ready reference to maintenance personnel when performing scheduled maintenance.
- To aid the maintenance department in aircraft inventory.

5. Select, from the following list, the purpose of sequence control charts/cards used with calendar and phase inspection.

- Used to control the assignment of work and personnel.
- Used to control the assignment of tools and materials.
- Used to control the overhaul of major aircraft components

6. Match each type of aircraft inspection, listed in column "A" with its correct definition, listed in column "B".

A

- (1) Turnaround inspection
- (2) Preflight inspection
- (3) Postflight inspection
- (4) Daily inspection
- (5) Special inspection
- (6) Conditional inspection
- (7) Calendar inspection
- (8) Phase inspection
- (9) Acceptance inspection
- (10) Transfer inspection

B

- a. Includes inventory and daily inspection.
- b. Includes inventory, functional test of emergency systems, and a daily inspection.
- c. An inspection which divides the work load into small, approximately equal packages which are accomplished sequentially.
- d. A scheduled inspection which provides for a detailed, searching inspection for material degradation.
- e. An unscheduled inspection required as a result of a specific overlimit condition.
- f. A scheduled inspection which is performed at a prescribed interval other than daily or calendar/phased.
- g. An inspection which is performed prior to the first flight of the day and is valid for a period of 72 hours if no flight occurs during this period.
- h. An inspection which is conducted after each flight to detect damage and to determine the need for servicing.
- i. An inspection which is performed prior to each flight and is valid for a period of 24 hours.
- j. An inspection which is conducted between flights and is valid for a period of 24 hours.

7. Select from a list provided, the information contained on the maintenance requirements card (MRC).

- a. Tasks relating to a logical sequence for accomplishment.
- b. Identifies the recommended rating/MOS
- c. Performance interval
- d. Work area/zone involved
- e. Ground support equipment
- f. Consumable, replaceable parts and assistance requirements.
- g. Illustration, clearances, tolerances, charts, partnumbers
- h. Quality assurance
- i. Electrical/hydraulic power required
- j. All of the above

NOTETAKING SHEET 5.3.1N

MAINTENANCE DATA SYSTEM

REFERENCE:

NAVAL AVIATION MAINTENANCE PROGRAM, OPNAVINST 4790.2B

NOTETAKING OUTLINE:

I. Purpose - _____

II. Categories of the MDS System:

A. _____

Source Document _____

B. _____

Source Document _____

C. _____

Source Document _____

D. _____

Source Document _____

E. _____

Source Documents _____

F. _____

Source Documents _____

III. Sub-system Capability Impact Reporting:

A. Purpose of SCIR Reporting:

1. It provides the following:

- a. _____
- _____
- b. _____
- _____
- c. _____
- _____

2. Uniquely defines the categories of:

- a. _____
- b. _____

B. SCIR data is generated by _____

ASSIGNMENT SHEET 5.3.1A

MAINTENANCE DATA SYSTEM

INTRODUCTION:

The purpose of this assignment sheet is to familiarize the student with the purpose and the different categories of the maintenance data system.

LESSON TOPIC OBJECTIVES:

5.3 SELECT, from a list provided, the purpose of the maintenance data system.

5.3.1 SELECT, from a list provided, the documents used to collect maintenance data.

5.3.2 SELECT, from a list provided, categories of data collected for the maintenance data system (MDS).

5.3.3 SELECT, from a list provided, the purpose of the sub-system capability impact reporting (SCIR) system.

STUDY ASSIGNMENT:

Complete Questions (1) through (4).

Study Questions:

1. SELECT, from the list provided, the purpose of the maintenance data system (MDS).

- a. To provide the data input to the naval aviation maintenance program (NAMP).
- b. To ensure that the basic data generated by maintenance/material personnel are documented and the total system thereafter provides information to all who require it.
- c. To provide the maintenance officer with a daily report of off duty man-hours.

2. SELECT, from the list provided, the documents which are used to collect maintenance data.

- a. MHA card and MRC cards.
- b. SAF and VIDS/MAF.
- c. VIDS/MAF and MRC cards.

3. SELECT from the list provided the categories of data which are to be collected for the maintenance data system (MDS)
 - a. Maintenance data, supply data, and man-hour data.
 - b. Maintenance data, supply data, and accounting data.
 - c. Material reporting data, maintenance data, and man-hour data.
4. SELECT, from the list provided, the system used to monitor mission capability of selected end items.
 - a. SCIR system.
 - b. MHA system.
 - c. TDUR system.

NOTETAKING SHEET 5.4.IN

MAINTENANCE DATA FORMS (VIDS/MAF & SAF)

REFERENCE:

NAVAL AVIATION MAINTENANCE PROGRAM, OPNAVINST 4790.2B

NOTETAKING OUTLINE:

I. The purpose of the VIDS/MAF is to document:

- A. _____
- _____
- B. _____

II. Types of maintenance actions requiring documentation:

- A. _____
- B. _____
- C. _____
- D. _____
- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- E. _____
- _____
- F. _____
- _____
- G. _____
- _____

H. _____

Visual Information Display System/Maintenance Action Form (OPNAV 4790/60) consists of _____, distribution is as follows:

A. VIDS/MAF distribution

1. Copy one - _____

2. Copy two - _____

3. Copy three - _____

4. Copy four - _____

5. Copy five - _____

B. Data blocks used in documenting maintenance actions:

1. Entries required signature block.

- a. _____
 - b. _____

2. Reference/local use block.

- a. _____
 - b. _____
- c. _____

3. Accumulated work hours block.

a. Name/Shift - _____

b. Date - _____

c. Man-Hours - _____

d. Elapsed Maintenance Time - _____

4. Accumulated AWM Hours Block.

a. _____

b. _____

5. (H/Z) Failed/Required Material Block.

a. Block 79 - _____

b. Block 08 - _____

c. Block 09 - _____

d. Block 10 - _____

e. Block 11 -

f. Block 14 -

g. Block 19 -

h. Block 34 -

i. Block 41 -

j. Block 43 -

k. Block 45 -

l. Block 49 -

m. Block 53 -

6. Block A22 - _____

a. Enter the WUC that identifies the:

(1) _____

(2) _____

(3) _____

7. Block A29 - _____

a. _____

b. _____

8. Block A32 - _____

a. _____

b. _____

9. Block A34 - _____

a. _____

b. _____

10. Block A35 - _____

a. _____

b. _____

11. Block A36 - _____
a. _____

b. _____

12. Block A39 - _____
a. _____

13. Block A41 - _____
a. _____

b. _____

14. Block A45 - _____
a. _____

b. _____

15. Blocks F08 to F19 - _____

16. Block A48 - _____
a. _____
b. _____

17. Block A52 - _____
a. _____
b. _____

18. Block A58 - _____

a. _____

b. _____

19. Block A59 - _____

a. _____

b. _____

20. Block A60 - _____

a. _____

b. _____

(1) _____

(2) _____

21. Block A62 - _____

a. _____

b. _____

22. Block A65 - _____

a. _____

b. _____

23. Block A74 - _____

24. Blocks F21 to F28 - _____

25. Block B08 - _____
a. _____

b. _____

26. Block B12 - _____
a. _____

b. _____

27. Block B16 - _____
a. _____

b. _____

28. Block B19 - _____
a. _____

b. _____

29. Block B23 - _____
a. _____
b. _____

30. Block B27 - _____

a. _____

b. _____

31. Block B30 - _____

a. _____

b. _____

32. Block B34 - _____

a. _____

33. Block B53 thru D17 - _____

a. _____

b. Job Status - _____

c. Date and Time Columns - _____

d. EOC Column - _____

34. Removed/Old Item-Blocks E08 thru 52

a. _____
b. _____
c. _____
d. _____
e. _____

(1) A - _____
(2) E - _____
(3) J - _____
(4) K - _____
(5) L - _____
(6) M - _____

f. Blocks E47 and E52 - _____

35. Installed/New Item Blocks G08 thru G48

- a. _____
- b. _____
- c. _____
- d. _____
- _____
- e. _____
- _____

36. Discrepancy Block - _____

- _____
- _____

37. Corrective Action Block - _____

- _____
- _____
- _____

38. blocks A08 thru A17 - _____

- _____
- _____
- c. _____
- _____

39. Block A19 - _____

- a. _____
- _____
- b. _____

40. Blocks A, B, C, and D - _____

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

41. CF REQ/RFI Block

- a. _____
- b. _____

42. QA REQ/BCM Block

- a. _____
- b. _____

43. Turn-in Document Block - _____

- _____
- _____
- _____
- _____

44. Inspected by Block - _____

- _____
- _____
- _____

45. Corrected by Block - _____

46. Supervisor Block - _____

V. Support Action Form (SAF)

1. Purpose - _____

a. _____
b. _____

2. Distribution of SAF:

a. _____

b. _____

c. _____

3. SAF's are documented in the following manner:

a. Block One - _____

(1) _____

(2) _____

b. Block Two - _____

(1) _____

(2) _____

c. Block Three - _____

d. Block Four - _____

e. Block Five - _____

f. Block Six - _____

(1) _____

(2) _____

g. Block Seven - _____

(1) _____

(2) _____

h. Block Eight - _____

(1) _____

(2) _____

i. Block Nine - _____

(1) _____

(2) _____

j. Block A - _____

(1) _____

(2) _____

k. Block B - _____

l. Block Ten - _____

(1) _____

(2) _____

INFORMATION SHEET 5.4.1I

MAINTENANCE DATA FORMS (VIDS/MAF & SAF)

INTRODUCTION:

The Visual Information Display System/Maintenance Action Form (VIDS/MAF) is designed to provide us a means of recording maintenance actions in coded form, so that a great variety of information may be retrieved concerning maintenance actions. This recording begins when a discrepancy is reported to maintenance control. The Support Action Form (SAF) is used to document or record support or nonrepair actions.

REFERENCE:

OPNAVINST 4790.2B

INFORMATION:

The Visual Information Display System/Maintenance Action Form (VIDS/MAF) is designed to provide a means of recording maintenance actions in sufficient detail so that a great variety of information may be retrieved concerning maintenance actions. This recording begins upon completion of each job when the worker turns in a completed source document.

The purpose of the VIDS/MAF is to document the time spent and the materials used in maintaining or repairing aircraft and support equipment.

The VIDS/MAF will be used to document maintenance actions involving troubleshooting, removal and replacement of parts, repair of parts, and the performance of scheduled inspections. When a discrepancy is reported to maintenance control, a VIDS/MAF is initiated. Parts 1 and 5 are sent to the work center involved.

When a maintenance task (discrepancy) is to be performed, certain blocks of the VIDS/MAF will be filled in by maintenance control and the work center supervisor.

Block A22 of the VIDS/MAF is the Work Unit Code.

Block A29 is the Action Organization block.

Block A35 is the Action Taken block.

Block A36 is the Malfunction Description Code block.

Block A39 is the Items Processed block. In this block, the worker will enter the numbers of work unit coded items processed while repairing the discrepancy.

In the Accumulated Work Hours block of the VIDS/MAF, the following information is entered; name and/or shift, date, man-hours, and EMT (Elapsed Maintenance Time) involved in repairing the discrepancy.

Block A41 is the Man Hours block. In this block is entered the total of the man-hours as found in the Accumulated Work Hours which were expended in repairing the discrepancy.

Block A45 is the Elapsed Maintenance Time (EMT). In this block is entered the total of the elapsed maintenance time as found in the Accumulated Work Hours section.

Block H-Z is the Failed/Required Material block. These blocks are provided for maintenance personnel to document failed parts and/or material required during the process of repairing the discrepancy.

The Reference/Local Use block of the VIDS/MAF is used by maintenance personnel to enter supply reference information.

The Accumulated Awaiting Maintenance (AWM) Hours block of the VIDS/MAF is used to record the awaiting maintenance hours accumulated against a job.

Blocks B38 through B49 of the VIDS/MAF are the Awaiting Maintenance Reason and Hours blocks. This section is used to record the total awaiting maintenance (AWM) hours and reason codes for SCIR (Sub-system Capability and Impact Reporting) related maintenance actions.

Blocks B08 through B34 of the VIDS/MAF comprise the Repair Cycle section. This section is used to record the dates, the times and the EOCs (Equipment Operational Capability) for when the discrepancy was received, went into work, and was completed.

Blocks B53 through D17 of the VIDS/MAF comprise the Maintenance/Supply Record section. In this section, the documentor, usually the shop supervisor, keeps record of the changes in a job status between maintenance and supply and the changes in mission capability.

The Job Control Number (JCN) is entered in blocks A08 through A14. The JCN is a number that serves as a base for maintenance data reporting and for maintenance control procedures.

The TYPE EQUIP (Type Equipment) code is entered in block A48. This code describes the end item on which the work is being performed.

The BU/SER (Bureau/Serial) NUMBER is entered in block A52. This is the bureau or serial number of the equipment or end item on which work is being performed.

The DISCD (When Discovered) code is entered in block A58. This code identifies when the need for maintenance was discovered.

The T/M (Type Maintenance) code is entered in block A59. This code describes the type of maintenance which is being performed.

Blocks F08 through F19 of the VIDS/MAF comprise the Technical Directive Identification section. This section is used to identify the specific Technical Directive which has been, or is being incorporated via the maintenance action.

The Removed/Old Item and Installed/New Item sections of the VIDS/MAF are completed when a repairable part/component is removed and another identical part/component is installed.

The Discrepancy section of the VIDS/MAF is used for entering a narrative description of the reported discrepancy.

The Corrective Action of the VIDS/MAF is used for entering a narrative description of the action taken to correct the discrepancy.

The Corrected By block of the VIDS/MAF is signed by the worker or crew leader upon completion of the maintenance action.

The Inspected By block of the VIDS/MAF is signed by the Quality Assurance Representative (QAR) or Collateral Duty Inspector (CDI) who inspects the completed maintenance action for proper standards.

The Supervisor block of the VIDS/MAF is signed by the work center supervisor or his assistant. It is signed after the VIDS/MAF has been screened for proper documentation and after tool control inventories have been conducted.

No. NLE 4011

WORK CENTER MDR VERIFICATION COPY

COPY 5
SAMPLE

VIDS/MAF OPNAV 4790/60 (REV. 2-82) S/N 0107-LF-047-9304

5 PART FORM
USE BALL-POINT PEN PRESS HARD

ENTRIES REQUIRED SIGNATURE

NONE LOGS REC

LOCAL USE		ACCUMULATED WORK HOURS					ACCUMULATED AWM HOURS									
		NAME/SHIFT	TOOL BOX	DATE	MAN HOURS	ELAPSED M/T			DATE	TIME	REASON	HOURS				
REFERENCE																
(H-Z) FAILED/REQUIRED MATERIAL																
79 INDEX	08 F/P	09 AWP	10 A/T	11 MAL	14 MFGR	19 PART NUMBER	34 REF SYMBOL	41 QTY	43 PROJ	45 PRI	49 DATE ORD	53 REQ NO	53 DATE REC			
<input type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input type="checkbox"/>															
<input type="checkbox"/>	<input type="checkbox"/>															
-FOLD-																
A22 WORK UNIT CODE		A29 ACTION ORG	A32 TRANS	A34 MAINT/L	A35 ACT TAKEN	A36 MAL CODE	A39 ITEMS/P	A41 MAN HOURS	A45 ELAPSED M/T	F08 INTERIM	TECHNICAL DIRECTIVE IDENTIFICATION					
										<input type="checkbox"/>	F09 CODE	F11 BASIC NO	F15 RV	F16 AM	F17 PART	F19 KIT
A46 TYPE EQUIP		A52 BU/SER NUMBER	A58 DISCD	A59 T/M	A60 POSIT	A62 FID	A65 SAFETY/EI SER	A69 METER	SE MFGR	A74	INVENTORY F21	F22 PERM UNIT CODE	F28			
REPAIR CYCLE				REMOVED/OLD ITEM					INSTALLED/NEW ITEM							
DATE TIME EOC				E08 MFGR E13 SERIAL NUMBER					E08 MFGR G13 SERIAL NUMBER							
RECEIVED	B08	B12	B16	E23 PART NUMBER					E38 DATE REMOVED		G23 PART NUMBER					
IN WORK	B19	B23	B27													
COMPLETED	B30	B34		E42 TIME/CYCLES		E47 TIME/CYCLES		E52 TIME/CYCLES	G38 TIME/CYCLES		G43 TIME/CYCLES		G48 TIME/CYCLES			
AWAITING MAINTENANCE																
B38 B39 HOURS		B43	B44 HOURS	B48	B49 HOURS	DISCREPANCY										
MAINTENANCE/SUPPLY RECORD																
JOB STATUS		DATE		TIME		EOC										
B53	B54	B58	B62													
B65	B66	B70	B74													
C08	C09	C13	C17													
C20	C21	C25	C29													
C32	C33	C37	C41													
C44	C45	C49	C53													
C56	C57	C61	C65													
D08	D09	D13	D17													
JOB CONTROL NUMBER				A19 WORK CENTER		CORRECTED BY		INSPECTED BY		SUPERVISOR		MAINT CONTROL				
A08 ORG	A11 DAY	A14 SER	A17 SUF			UP <input type="checkbox"/>	DOWN <input type="checkbox"/>	MODEX	PRI	TURN-IN DOCUMENT	SYSTEM/REASON		MCN			

SUPPORT ACTION FORM (SAF)

In this lesson topic, you will learn the purpose of a Support Action Form (SAF), the use of block numbers 1 through 9 and blocks "A" and "B" of the Support Action Form and will identify a correctly documented SAF for a given support action example.

The Support Action Form (SAF) is used to document or record support or nonrepair actions.

The support action code is a three character numeric code used to identify routine, repetitive maintenance actions.

Block 1 of the SAF card, labeled TYPE EQUIP, contains the four-character code that identifies the aircraft type for which the support action was accomplished.

Block 2 of the SAF card, labeled ACT. ORG., contains the three-character code that denotes the activity or squadron accomplishing the support action.

Block 3 of the SAF card, is labeled WORK CENTER and contains the three-character code which identifies the work center completing the support action.

Block 4 of the SAF card, labeled MAINT. LEVEL, is used to record what level of maintenance activity performs the support action.

Block 5 of the SAF card, labeled ACTION DATE, will contain the Julian date of the day that the action was completed.

Block 6 of the SAF card is labeled SUPPORT CODE and will contain the three-character code that identifies the category of support action which is being documented.

Block 7 of the SAF card is labeled TYPE MAINTENANCE. Type maintenance codes are those codes which are used to denote the type of support provided within the general category of support action.

Block 8 of the SAF card is used to document the number of items on which the action was performed.

Block 9 of the SAF card is used to record the total time spent in accomplishing the support action.

Block A of the SAF card, labeled LOCAL CONTROL, is provided for use by the squadron on an optional basis.

Block B of the SAF card, labeled SIGNATURE, is provided for the signature of the worker that completed or was responsible for completing the support action being documented.

Figure 5-1 is a completed SAF card.

Starting with block 1, the completed SAF indicated that: an A4B aircraft (AACB) assigned to VA-43 (AC4) was supported by the Plane Captains Branch (310). VA-43 is an organizational level activity (1). This action was completed on 31 May 1975 (5151). The support action taken was an inspection (030) which was a daily, preflight, postflight, or special, type of inspection (D). This inspection took 2.3 hours to accomplish and was performed on aircraft BUNQ #157310 by J. Clarkin. ADJ1 W. E. Baker was the work center supervisor.

ASSIGNMENT SHEET 5.4.1A

MAINTENANCE DATA FORMS (VIDS/MAF & SAF)

INTRODUCTION:

The purpose of this assignment sheet is to provide the student with basic information of the VIDS/MAF and SAF. It is important to know which publications and codes needed in order to complete the VIDS/MAF and SAF.

LESSON TOPIC LEARNING OBJECTIVES:

- 5.4 SELECT, from a list provided, the purpose of the visual information display system/maintenance action form (VIDS/MAF).
- 5.4.1 MATCH each of the VIDS/MAF block titles, listed in column "A", with the information to be recorded in each block, listed in column "B".
- 5.4.2 COMPLETE selected blocks of a VIDS/MAF, utilizing a simulated maintenance situation and VIDS/MAF provided.
- 5.4.3 MATCH a list of codes, from a work unit code manual, listed in column "A" with the appropriate VIDS/MAF block, listed in column "B".
- 5.4.4 SELECT, from a list provided, those parts of a VIDS/MAF that are used by the work center.
- 5.4.5 SELECT, from a list provided, those maintenance actions which are documented on the VIDS/MAF.
- 5.4.6 SELECT, from a list provided, the purpose of the support action form (SAF).
- 5.4.7 MATCH each of the SAF block titles, listed in column "A" with its appropriate code, listed in column "B".
- 5.4.8 MATCH each of the SAF block titles, listed in column "A" with the information to be recorded in each block, listed in column "B".
- 5.4.9 SELECT, from a list provided, the definition of the support action code.
- 5.4.10 SELECT, from examples provided, for a given maintenance situation, the correctly documented support action form (SAF).
- 5.4.11 COMPLETE selected blocks of a SAF card, utilizing a simulated maintenance situation, SAF card and work unit code manual

provided.

STUDY ASSIGNMENT:

Read information sheet 5.4.1I, then answer questions (1) through (9) using information provided and work unit code manual.

STUDY QUESTIONS:

1. SELECT, from the list below, the purpose of the VIDS/MAF.
 - a. To keep the maintenance officer informed of all man-hours expended in aircraft and component repair.
 - b. To document the time and the materials expended maintaining aircraft and support equipment.
 - c. To keep the maintenance officer informed of all materials used on aircraft and support equipment.
2. SELECT, from the list below, the part(s) of the VIDS/MAF used by the work center.
 - a. Parts 1 and 5
 - b. Part 4
 - c. Part 2
 - d. Parts 3 and 4
3. SELECT, from the list below, those maintenance actions which are documented on the VIDS/MAF.
 - a. Maintenance actions involving unscheduled inspection, scheduled inspection, repair of parts, and servicing.
 - b. Maintenance actions involving troubleshooting, removal and replacement of parts repair of parts, and the performance of scheduled inspections.
 - c. Maintenance actions involving the removal and replacement of end items, and preflight/daily inspections.
 - d. Maintenance actions involving the repair of parts on ground support equipment.

4. MATCH each of the VIDS/MAF block titles listed in column "A" with the information to be recorded in each block, listed in column "B".

<u>A</u>	<u>B</u>
____ (1) A22	a. BU/SER
____ (2) A29	b. Type equip
____ (3) A35	c. Job control number
____ (4) A36	d. Awaiting maintenance reason and hours
____ (5) A39	e. Failed/required material block
____ (6) A41	f. Elapsed maintenance time
____ (7) A45	g. Man hours block
____ (8) H-Z	h. Items processed block
____ (9) B38 through B49	i. Narrative descriptive of the reported discrepancy.
____ (10) A08 through A14	j. Malfunction description code block.
____ (11) A48	k. Action taken block.
____ (12) A52	l. Action organization block
____ (13) Discrepancy block	m. Work unit code

5. Complete selected blocks of a VIDS/MAF utilizing simulated maintenance situation and blank VIDS/MAF. The following information is provided to aid you in completing the VIDS/MAF.

- a. Action Taken: R
- b. WUC: 13137
- c. Item Needed: HYD Hose
- d. MFGR Code: 25781
- e. Part Number: MS3176411-2
- f. Qty Needed: 1 EA.
- g. Requisition Number: G102
- h. Priority: 03
- i. Malfunction Code: 070
- j. Dated Ordered and Received: 4151
- k. Transaction Code: 11
- l. Maint Level: 1
- m. Items Processed: 1

n. Job Completed: Date 4151, Time: 1120, Supply: 0920 until
1020

Complete the VIDS/MAF on the next page.

FOR TRAINING PURPOSES ONLY

5 PART FORM
USE BALL-POINT PEN PRESS HARD

ENTRIES REQUIRED SIGNATURE

10 | NONE LOGS REC

□ □ □

VIDS/MAF OPNAV 4790/60 (REV. 1-80) S/N 0107-LF-047-9303

-FOLD-											TECHNICAL DIRECTIVE IDENTIFICATION				
A22 WORK UNIT CODE	A29 ACTION ORG	A32 TRANS	A34 MAINT/L	A35 ACT TAKEN	A36 MAL CODE	A39 ITEMS/P	A41 MAN HOURS	A45 ELAPSED M/T	F08 INTERIM	F09 CODE	F11 BASIC NO	F15 RV	F16 AM	F17 PART	F19 KIT
A46 TYPE EQUIP	A52 BU/SER NUMBER	A55 DISCD	A59 T/M	A60 POSIT	A62 FID	A65 SAFETY/EI SER	A69 METER	A74	<input type="checkbox"/>	F21	INVENTORY F22 PERM UNIT CODE	F28			

REPAIR CYCLE				REMOVED/OLD ITEM			INSTALLED/NEW ITEM		
	DATE	TIME	EOC	E08 MFGR	E13 SERIAL NUMBER		G08 MFGR	G13 SERIAL NUMBER	
RECEIVED	B08	B12	B16						
IN WORK	B18	B23	B27	E23 PART NUMBER		E38 DATE REMOVED	G23 PART NUMBER		
COMPLETED	B30	B34		E42 TIME/CYCLES	E47 TIME/CYCLES	E52 TIME/CYCLES	G38 TIME/CYCLES	G43 TIME/CYCLES	G48 TIME/CYCLES
AWAITING MAINTENANCE				DISCREPANCY			CORRECTIVE ACTION		
B38 B39 HOURS	B43 B44 HOURS	B48 B49 HOURS							

MAINTENANCE/SUPPLY RECORD

JOB STATUS	DATE	TIME	EOC		
B53	B54	B58	B62		

865 866 870 874

C08 C09 C13 C17

C20 C21 C25 C29

C32 C33 C37 C41

C44 C45 C49 C53

C56 C57 C61 C65

D08 D09 D13 D17 a b CF REQ QA REQ INSPECTED BY CORRECTED BY

JOB CONTROL NUMBER				A19 WORK CENTER	RPI	BCM
A08 ORG	A11 DAY	A14 SER	A17 SUF	   TURN-IN DOCUMENT 		
      						
SUPERVISOR						

6. SELECT, from the list below, the purpose/use of the support action form.

- Used to document man-hours spent by support activites on maintenance tasks.
- Used to record support on nonrepair actions.
- Used to document man-hours spent in support of the VIDS/MAF.

7. SELECT, from the list below, the definition of the support action code.

- A three-character numeric code used to identify routine repetitive maintenance actions.
- A three-character code used to identify a particular piece of equipment on which maintenance is performed.
- A three-character code used to identify man-hours expended on any non-maintenance task.

8. MATCH each of the SAF block titles listed in column "A", with its appropriate code, listed in column "B".

<u>A</u>	<u>B</u>
____ (1) Block One	a. Signature
____ (2) Block Two	b. Local control/BUNO
____ (3) Block Three	c. Man-hours
____ (4) Block Four	d. Items processed
____ (5) Block Five	e. Type maintenance
____ (6) Block Six	f. Support code
____ (7) Block Seven	g. Action date
____ (8) Block Eight	h. Maintenance level
____ (9) Block Nine	i. Work Center
____ (10) Local Control/BUNO	j. Action Organization
____ (11) Signature	k. Type equipment code

8. For a given maintenance situation, correctly document the support action form (SAF). Following information provided:

TEC: AACD

BUENO: 123456

TYPE OF INSPECTION: Preflight

ACT ORG: AC9

WORK CENTER: 310

JULIAN DATE: 4152

MANHOURS SPENT: 4.2

Using the blank SAF, document the correct codes.

SUPPORT CODES

010	OPERATIONAL SUPPORT
020	CLEANING / DEPRESERVATION
030	INSPECTION (EXCLUDES CORROSION)
040	CORROSION PREVENTION (MISC.)
041	AIRFRAME / ENCLOSURES
042	POWER PLANTS
043	PROPELLERS / HELICOPTER DYNAMIC COMPONENTS
044	UTILITIES
045	ELECTRONICS/ELECTRICAL
046	PHOTOGRAPHIC
047	ARMAMENT/ORDNANCE
048	SAFETY / SURVIVAL
049	PRESERVATION
050	GENERAL FUNCTIONS
060	ENGINE BUILDUP, TEARDOWN, TEST STAND OPERATION
070	MISSION SHOP SUPPORT
080	INSPECTION OF AVIATORS' EQUIPMENT, SAFETY AND SURVIVAL EQUIPMENT
090	NON-AERONAUTICAL WORK

TYPE MAINTENANCE CORES

- A GENERAL SUPPORT**
- B TURNAROUND, PREFLIGHT,
PREOPERATIONAL, OR
PRELAUNCH INSPECTION**
- D DAILY, DAILY / POSTFLIGHT,
OR POSTOPERATIONAL
INSPECTION**
- F TRANSIENT MAINTENANCE**
- L LOCAL MANUFACTURE**
- T SUPPLY SUPPORT**
- U RECLAMATION AND SALVAGE**

AIRCRAFT SUPPORT EQUIPMENT

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit VI.

TERMINAL OBJECTIVE

6.0 DEMONSTRATE a knowledge of the equipment utilized in handling naval aircraft, by SELECTING or MATCHING the correct answers from lists provided.

ENABLING OBJECTIVES

6.1 MATCH each type of support equipment, listed or illustrated in column "A", with its description, use or purpose listed in column "B".

6.1.1 SELECT, from a list provided, the purpose of a universal towbar.

6.1.2 SELECT, from a list provided, the primary purpose of a tow tractor.

6.1.3 MATCH each type of tow tractor, listed in column "A", with its designated use, listed in column "B".

6.1.4 SELECT, from a list provided, the purpose of a mobile electric powerplant.

6.1.5 MATCH each of the three types of mobile electric powerplants, listed in column "A", with its description, listed in column "B".

6.1.6 SELECT, from a list provided, the purpose of a gas turbine compressor.

6.1.7 MATCH each of the three types of gas turbine compressors, listed in column "A", with its description, listed in column "B".

6.1.8 SELECT, from a list provided, the purpose of a mobile air conditioner.

6.1.9 MATCH each of the aircraft servicing trailers, listed in column "A", with its purpose, listed in column "B".

- 6.1.10 SELECT, from a list provided, the purpose of an adjustable maintenance platform.
- 6.1.11 SELECT, from a list provided, the three most commonly used aircraft jacks.
- 6.1.12 SELECT, from a list provided, the safety precautions to be observed when utilizing aircraft workstands.

NOTETAKING SHEET 6.1.1N

SUPPORT EQUIPMENT

REFERENCES:

AIRMAN, NAVEDTRA 10307-E, Chapter 11

NOTETAKING OUTLINE:



I. Purpose of a tow bar.

- A. The primary purpose of a tow bar is to _____
- B. The universal tow bar, _____, is the most _____ commonly used in Naval Aviation. Designed to be attached to the aircraft with either _____ or _____ mounted tow rings.

II. Purpose of a tow tractor.

- A. The tow tractor is the _____ means of moving an _____ on the ground when the engines are _____.
- B. Tow tractors are _____ designed to transport _____ and/or _____.

III. Types of tow tractors.

- A. TA-18
 1. Used for towing and spotting _____
 2. Used only at _____.
- B. TA-75
 1. The most _____ at _____.
 2. Intended to tow _____ and _____.
 3. May be used for towing and spotting _____.
- C. MD-3A
 1. Designed for use _____.

2. Capable of towing any type of _____
3. Has a built-in _____ which provides compressed air to _____

D. SD-1D Spotting Dolly- _____, _____, and _____ aircraft aboard aircraft carriers in _____, _____ areas.

IV. Purpose of the mobile electrical powerplant.

- A. Supplies _____ and _____ electrical power for various _____ and _____ operations of _____.

- B. Mobile means that the units are _____.

V. Types of mobile electric powerplants with their description.

A. NC-2A

1. Designed primarily for _____ use aboard _____.
2. Supplies both _____ and _____ electrical power to _____.
3. Personnel must possess a _____ to operate and _____ this unit.

B. NC-8A

1. Supplies electrical power for _____ and _____ aircraft.
2. Widely used at _____.
3. _____ is required to operate and drive this unit.

C. NC-10B

1. Designed to supply electrical power on both _____ and _____.
2. The operators controls are located on the _____.

VI. Purpose of the Gas Turbine Compressor (GTC)

The GTC provides _____ air to _____ turbo-jet and turbo-prop engines.

VII. Three types of Gas Turbine Compressors and their description.

A. GTC-85

1. May be enclosed in a _____.
2. The _____ allows it to be _____ from an aircraft bomb rack for transportation.
3. Most GTC-85's are mounted on the _____ for _____ operations.

B. NCPP-105

1. This is a complete _____ unit mounted on a _____ or a _____.
2. Supplies air at _____ pressure ratios - _____ and _____. This accommodates aircraft with different starting ratios.
3. This unit will also supply _____ or _____ electrical power for operation of aircraft electrical _____.

C. RCPT-105

1. May be housed in a _____ or on a _____.
2. Supplies air for starting _____.
3. Also supplies _____ or _____ power.

4. This unit can also supply air for _____
and _____.

VIII. Purpose of the NR-3 and NR-10 mobile air conditioners.

A. These mobile air conditioners are _____
and _____ units.

B. They supply air conditioning to the _____ and
_____ during
_____ of the aircraft's various systems.

IX. Aircraft servicing trailers with their purpose.

A. NAN-2 Nitrogen Servicing Unit

1. Provides a _____ source of compressed _____
to recharge aircraft _____.
2. Designed to carry _____ nitrogen bottles with
_____ and _____.
3. Nitrogen bottles are painted _____ with
_____ black stripes _____ the
bottles.

B. TMU 70/M Oxygen Storage Tank

1. Used in servicing the aircraft's _____
_____.
2. Comprised of three major components.
 - a. _____
 - b. _____
 - c. _____

X. Purpose of the adjustable maintenance platform.

Enables _____ to work _____
at _____ varying from _____ to a _____

_____.

XI. Three most commonly used aircraft jacks.

A. Hand Axel Jack - _____

B. Fixed Height Tripod Jack - _____

C. Variable Height Tripod Jack - _____

XII. Safety precautions when using portable workstands.

A. Always ensure that _____

B. Ensure that the _____

C. Install the _____

D. Clean all _____

XIII. Safety precautions when operating support equipment.

A. When stopping all self propelled equipment, _____

B. Ensure the area when engine powered equipment is operated
is _____

C. Position GTC to minimize _____

D. Use each piece of equipment for _____

XIV. Safety precautions when servicing or ground testing

aircraft.

A. Ensure that _____.

B. Ensure that all support equipment is _____

C. Ensure that a _____

D. Follow all _____

INFORMATION SHEET 7.0.1I

AIRCRAFT CLEANING AND CORROSION CONTROL

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit VII.

TERMINAL OBJECTIVE

7.0 DEMONSTRATE a knowledge of aircraft cleaning and corrosion control procedures, documenting the required actions on a Support Action Form (SAF).

ENABLING OBJECTIVES

- 7.1 SELECT, from a list provided, the purpose of cleaning an aircraft.
- 7.1.1 SELECT, from a list provided, the procedural steps to perform prior to cleaning an aircraft.
- 7.1.2 MATCH the ordered steps in cleaning an aircraft, listed in column "A", with the description of each step, listed in column "B".
- 7.1.3 SELECT, from a list provided, the procedural steps to perform after cleaning aircraft.
- 7.1.4 SELECT, from a list provided, the safety precautions to be observed when cleaning an aircraft.
- 7.2 SELECT, from a list provided, the definition of corrosion.
- 7.2.1 MATCH each of the four metals, listed in column "A", with its type of corrosion description, listed in column "B".
- 7.2.2 MATCH each type of corrosion, listed in column "A", with its definition, listed in column "B".
- 7.2.3 MATCH the ordered steps in the treatment of corrosion, listed in column "A", with the description of each step, listed in column "B".
- 7.2.4 SELECT, from a list provided, the primary purpose for painting an aircraft.
- 7.2.5 SELECT, from a list provided, the manner in which corrosion under a painted surface is detected.

- 7.2.6 SELECT, from a list provided, the safety precautions to be observed when using paints or solvents.
- 7.2.7 SELECT, from a list provided, the reference that will provide additional aircraft cleaning and corrosion control information.
- 7.2.8 DOCUMENT simulated aircraft cleaning and corrosion procedures by completing selected blocks of a given Support Action Form (SAF).

NOTETAKING SHEET 7.1.1N

AIRCRAFT CLEANING

REFERENCES:

AIRMAN, NAVEDTRA 10307-E, Chapter 12

NOTETAKING OUTLINE:

I. The purpose of cleaning an aircraft.

A. _____

B. _____

C. _____

D. _____

II. Procedural steps prior to cleaning an aircraft.

A. Lubricate all areas that have _____

B. Ensure that all drain holes are _____

C. Cover all _____

D. Close all _____

III. Steps/description in cleaning an aircraft.

Water Emulsion Cleaning method - _____

A. _____

B. _____

C. _____

D. _____

E. _____

IV. Steps to perform after cleaning an aircraft.

A. _____

B. _____

C. _____

D. _____

E. _____

V. Safety precautions to be observed when cleaning an aircraft.

A. Protective clothing _____

B. Observe all precautions to prevent _____

C. Check the condition of all stands and ladders and ensure _____

D. Cover all components and areas that can be _____

E. Do NOT scrub _____

F. Use correct _____

NOTETAKING SHEET 7.2.1N

CORROSION CONTROL

REFERENCES:

AVIATION STRUCTURAL MECHANIC S 3&2, NAVTRA 10308-C, Chapter 11

NOTETAKING OUTLINE:

I. The definition of corrosion - _____

II. Four metals and their corrosion description.

A. Iron and Steel - _____

B. Aluminum - _____

C. Copper and Copper Alloys - _____

D. Magnesium - _____

III. Types of corrosion and their definition.

A. Direct Surface Attack Corrosion - _____

B. Galvanic or Dissimilar Metal Corrosion - _____

C. Intergranular Corrosion - _____

IV. Ordered steps in the treatment of corrosion.

A. Step 1 - _____

B. Step 2 - _____

C. Step 3 - _____

D. Step 4 - _____

V. The primary purpose for painting an aircraft.

VI. Detecting corrosion under a painted surface.

VII. Safety precautions when using paints and solvents.

A. DO NOT use _____

B. Use in _____ and wear _____

C. Use only _____

D. Ensure _____

E. Wear approved _____

VIII. Reference for additional information.

INFORMATION SHEET 8.0.1I

AVIATION SAFETY

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit VIII.

TERMINAL OBJECTIVE

7.0 DEMONSTRATE a knowledge of safety pertaining to halocarbons, firefighting, and Foreign Object Damage (FOD), by SELECTING or MATCHING the correct answer from lists provided.

ENABLING OBJECTIVES

- 8.1 SELECT, from a list provided, the definition of a halocarbon.
- 8.1.1 SELECT, from a list provided, the safety precautions to be observed when using halocarbons.
- 8.1.2 SELECT, from a list provided, the three categories of halocarbons.
- 8.1.3 SELECT, from a list provided, the required action to take should non-protecting clothing become wet with any kind of halocarbon.
- 8.1.4 SELECT, from a list provided, the proper disposal procedures for halocarbons.
- 8.1.5 SELECT, from a list provided, the reference that will provide additional halocarbon safety information.
- 8.2 SELECT, from a list provided, the responsibilities of an aircraft firefighter.
- 8.2.1 SELECT, from a list provided, the elements required for a fire to take place.
- 8.2.2 SELECT, from a list provided, the reason for grouping fires by class.
- 8.2.3 MATCH each class of fire, listed in column "A", with its extinguishing agent(s) listed in column "B".
- 8.2.5 SELECT, from a list provided, the extinguishing agents that present a danger of flashback when used to combat a class "B" fire.

- 8.2.6 SELECT, from a list provided, the fastest and most effective extinguishing agent to use on a fuel-spill fire.
- 8.2.7 SELECT, from a list provided, the first step to take when combating a class "C" fire.
- 8.2.8 SELECT, from a list provided, the fuel tank condition that presents the greatest fire or explosion hazard.
- 8.2.9 SELECT, from a list provided, the prescribed action of a firefighter when combating an aircraft fire involving ordnance.
- 8.2.10 SELECT, from a list provided, the prescribed action of a firefighter when combating an aircraft wheel fire.
- 8.2.11 SELECT, from a list provided, the extinguishing agent to use on an aircraft wheel fire.
- 8.2.12 SELECT, from a list provided, the reference that will provide additional aircraft firefighting safety information.

- 8.3 SELECT, from a list provided, the primary cause of premature removal of gas turbine engines from naval aircraft.
- 8.3.1 SELECT, from a list provided, the definition of Foreign Object Damage (FOD).
- 8.3.2 SELECT, from a list provided, the primary cause of Foreign Object Damage (FOD).
- 8.3.3 SELECT, from a list provided, those who are responsible for the prevention of Foreign Object Damage.
- 8.3.4 SELECT, from a list provided, the best method of preventing Foreign Object Damage.
- 8.3.5 SELECT, from a list provided, the individual to whom you should report any potential Foreign Object Damage hazard.
- 8.3.6 SELECT, from a list provided, the reference that will provide additional Foreign Object Damage safety information.

NOTETAKING SHEET 8.1.1N

HALOCARBONS

REFERENCES:

Consolidated Hazardous Items List (CHIL)

NOTETAKING OUTLINE:

I. Definition of a Halocarbon.

A. _____

B. Brand names of a few compounds containing halocarbons.

1. _____

2. _____

3. _____

II. Safety precautions when using halocarbons.

A. Protective clothing and equipment _____

1. _____

2. _____

3. _____

4. _____

5. _____

B. A minimum of _____

C. Ensure adequate _____

III. Three categories of halocarbons.

A. _____

B. _____

C. _____

IV. Action to take when clothing becomes wet with halocarbons.

V. Disposal procedures for halocarbons.

A. Types of halocarbons

B. Location

VI. Additional reference for halocarbon safety.

NOTETAKING SHEET 8.2.1N

FIREFIGHTING

REFERENCES:

AIRMAN, NAVEDTRA 10307-E, Chapter 4

NOTETAKING OUTLINE:

I. Responsibilities of an aircraft firefighter.

A. _____

B. _____

II. Elements required for a fire to take place.

A. The process of fire may be regarded as a _____.
1. _____ - _____
2. _____ - _____
3. _____ - _____

B. Removal of any one of these elements will _____.
1. _____ - _____
2. _____ - _____
3. _____ - _____

III. Reason for grouping fires by class - _____

IV. Classes of fires and the fuel that feeds them.

A. Class "A" Fires - _____

B. Class "B" Fires - _____

C. Class "C" Fires - _____

D. Class "D" Fires - _____

V. Class of fires with extinguishing agents.

A. Class "A" Fires - _____

B. Class "B" Fires - _____

C. Class "C" Fires - _____

D. Class "D" Fires - _____

NOTE: _____

VI. Class "B" Fire Flashbacks.

VII. Fuel Spill Fire Extinguishing Agent.

Most effective extinguishing agents.

A. _____

B. _____

VIII. First step in combating Class "C" Fires.

IX. Fuel Tank Explosion Hazards.

X. Combating a fire involving Ordnance.

A. _____

B. _____

C. _____

XI. Combating an aircraft wheel fire.

A. _____

B. _____

C. _____

XII. Extinguishing agent for a wheel fire - _____

XIII. Additional firefighting information is contained in _____

NOTETAKING SHEET 8.3.1N

FOREIGN OBJECT DAMAGE

REFERENCES:

THE NAVAL AVIATION MAINTENANCE PROGRAM, OPNAVINST 4790.2B, Volume II, Chapter 1

NOTETAKING OUTLINE:

I. Primary cause of premature engine removal - _____

II. Definition of Foreign Object Damage (FOD).

III. Primary causes of FOD.

A. Poor housekeeping - _____

B. Poor maintenance practice - _____

C. Everyday carelessness - _____

IV. Personnel responsible for preventing FOD.

V. Best method of FOD prevention.

VI. Reporting FOD hazards -

VII. Additional FOD information -

INFORMATION SHEET 9.0.1I
AIRCRAFT TOOLS AND HARDWARE

INTRODUCTION:

The purpose of this information sheet is to familiarize the student with the lesson objectives for Unit IX.

TERMINAL OBJECTIVE

9.0 FABRICATE and INSTALL a sheet metal plate onto a given shop fixture, using tools, hardware, and job program provided. All procedures and safety precautions must be observed in accordance with the job program.

ENABLING OBJECTIVES

9.1 PRACTICE tool control and use of handtools, utilizing tools, hardware, equipment, and procedures listed in the job program.

9.1.1 SELECT, from a list provided, the primary objective of the Tool Control Program.

9.1.2 SELECT, from a list provided, the benefits of the Tool Control Program.

9.1.3 SELECT, from a list provided, the concept of the Tool Control Program.

9.1.4 SELECT, from a list provided, the person(s) responsible for conducting toolbox sight inventories.

9.1.5 SELECT, from a list provided, the required information etched on each tool.

9.1.6 SELECT, from a list provided, the action required when a tool is missing.

9.2 MATCH or SELECT, from a list provided, the designed purpose and size of each hand tool indicated.

9.2.1 SELECT, from a list provided, the designed purpose of a wrench.

9.2.2 MATCH each type wrench, illustrated in column "A", with its designed purpose, listed in column "B".

9.2.3 SELECT, from a list provided, the reason for using the correct size wrench.

9.2.4 MATCH each type of screwdriver, listed in column "A", with its designed purpose, listed in column "B".

9.2.5 SELECT, from a list provided, the reasons for using the correct size screwdriver.

9.2.6 MATCH each type of pliers, illustrated in column "A", with its designed purpose listed in column "B".

9.2.7 SELECT, from a list provided, the designed purpose of the ball-peen hammer.

9.2.8 MATCH each of the punches, illustrated in column "A", with its purpose, listed in column "B".

9.2.9 MATCH each marking tool, illustrated in column "A", with its designed purpose, listed in column "B".

9.2.10 MATCH each cut of file, listed in column "A", with its designed purpose listed in column "B".

9.2.11 MATCH each file cross-sectional shape, illustrated in column "A", with its designed purpose listed in column "B".

9.2.12 SELECT, from the list provided, the purpose of the file card.

9.2.13 SELECT, from the list provided, the designed purpose of a socket.

9.2.14 SELECT, from a list provided, the manner in which wrenches and socket wrench sets are sized.

9.2.15 MATCH each type socket handle, listed in column "A", with its designed purpose, listed in column "B".

9.2.16 SELECT, from a list provided, the purpose of the steel rule.

9.2.17 SELECT, from a list provided, the purpose of the universal joint and the bar extension.

9.2.18 SELECT, from a list provided, the manner in which drill bits are classified.

9.2.19 SELECT, from a list provided, the purpose of a vise.

9.2.20 SELECT, from a list provided, the procedure to follow to properly care for a vise.

9.3 MATCH or SELECT, from lists provided, aircraft hardware by name, type, purpose, use, markings and dimension.

9.3.1 MATCH each type of screw, illustrated in column "A", with its correct name, listed in column "B".

9.3.2 MATCH each type of structural screwhead, illustrated in column "A", with its correct name, listed in column "B".

9.3.3 MATCH each type of standard aircraft bolt, illustrated in column "A", with its designed purpose, listed in column "B".

9.3.4 MATCH each bolthead marking, illustrated in column "A" with its description, listed in column "B".

9.3.5 MATCH each of the bolt-dimension terms, listed in column "A", with its dimension, illustrated in column "B".

9.3.6 MATCH each type of nut, illustrated in column "A", with its designed purpose, listed in column "B".

9.3.7 MATCH each type of washer, illustrated in column "A" with its designed purpose, listed in column "B".

9.3.8 SELECT, from a list provided, the designed purpose of turn-lock fasteners.

9.3.9 SELECT, from a list provided, the purpose of bonding wire on an aircraft.

9.4 SELECT, from a list provided, the definition of torque.

9.4.1 SELECT, from a list provided, the units of torque measurement.

9.4.2 SELECT, from a list provided, the manuals containing torque value information.

9.4.3 SELECT, from a list provided, the types of torque wrenches used in naval aviation.

9.4.4 SELECT, from a list provided, the indication given when the preset value is reached on micrometer setting torque wrench.

9.4.5 SELECT, from a list provided, a situation requiring the torque wrench to be recalibrated.

9.4.6 SELECT, from a list provided, a general safety rule to be observed when lockwire safetying.

9.4.7 SELECT, from a list provided, the purpose of a cotter pin.

NOTETAKING SHEET 9.1.1N

TOOL CONTROL

REFERENCES:

THE NAVAL AVIATION MAINTENANCE PROGRAM, OPNAVINST 4790.2C, Volume II, Chapter 3

NOTETAKING OUTLINE:

I. Primary objective of the Tool Control Program (TCP)

A. _____

B. _____

II. Concept of the Tool Control Program - _____

A. _____
B. _____

III. Benefits of the TCP

A. The most significant benefit is _____

B. Additional benefits

1. _____
2. _____
3. _____

4. _____

IV. Person responsible for tool inventory - _____

V. Required information on each tool

A. Each tool in the tool container will be _____
with the required information.

1. _____
2. _____
3. _____

B. Example - _____

C. Special accountability procedures shall be established
locally for those tools _____

VI. Required action for missing tools

A. Missing tools require prompt action/attention.

1. _____
2. _____
3. _____
4. _____
5. _____

B. The aircraft involved _____ released for flight until the _____ and the _____ are personally satisfied that the tool is not in the aircraft.

NOTETAKING SHEET 9.2.1N

COMMON HANDTOOLS

REFERENCES:

TOOLS AND THEIR USES, NAVPERS 10085-B

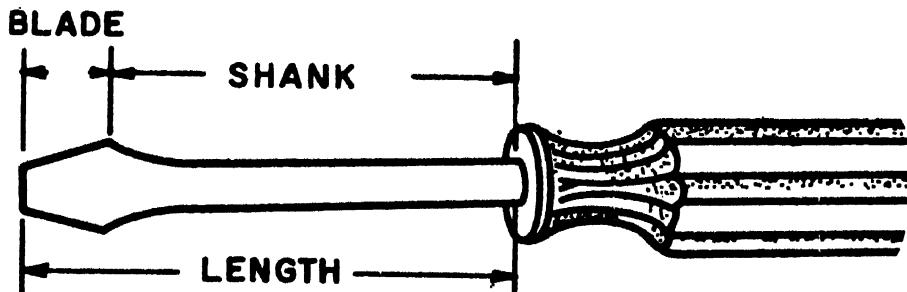
NOTETAKING OUTLINE:

I. Screwdrivers

A. Designed purpose of a screwdriver - _____

B. Types of screwdrivers

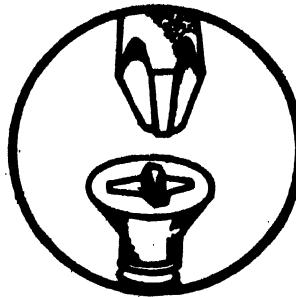
1. Standard (Straight Slot)



Used with _____

Classified by the size _____

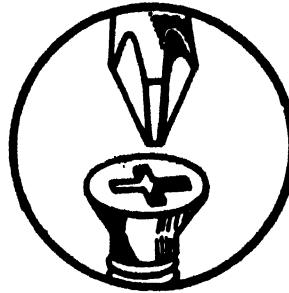
2. Phillips



Used for _____

Proper size is _____

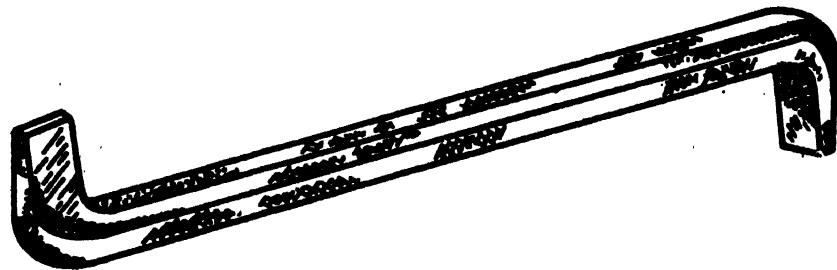
3. Reed and Prince



Used with _____

Distinguishing features _____

4. Offset



Designed for use when _____

Available in _____

C. Screwdrivers should _____

II. Reasons for using the correct size screwdriver.

A. _____

B. _____

III. Wrenches

A. Designed purpose of a wrench _____

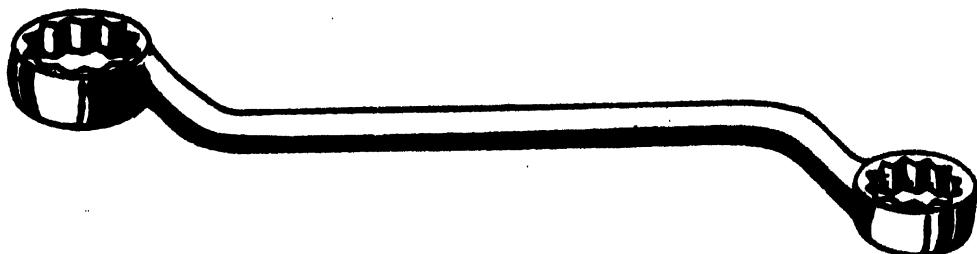
IV. Types of wrenches.

A. Open-end wrench



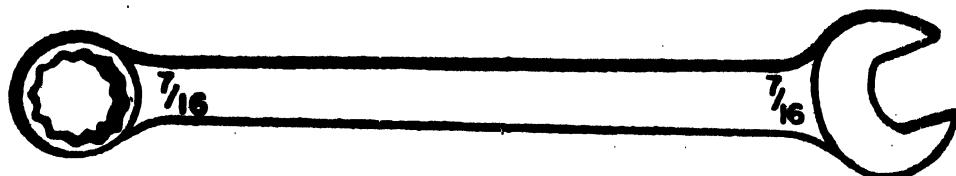
Used to _____

B. Box-end wrench



Used to _____

C. Combination wrench



Dual purpose: (1) _____
_____ (2) _____

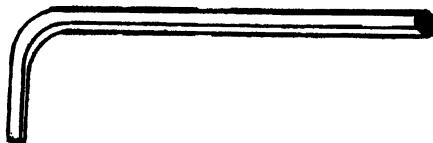
D. Adjustable wrench or cresent wrench



Used when _____

The wrench should be turned toward _____

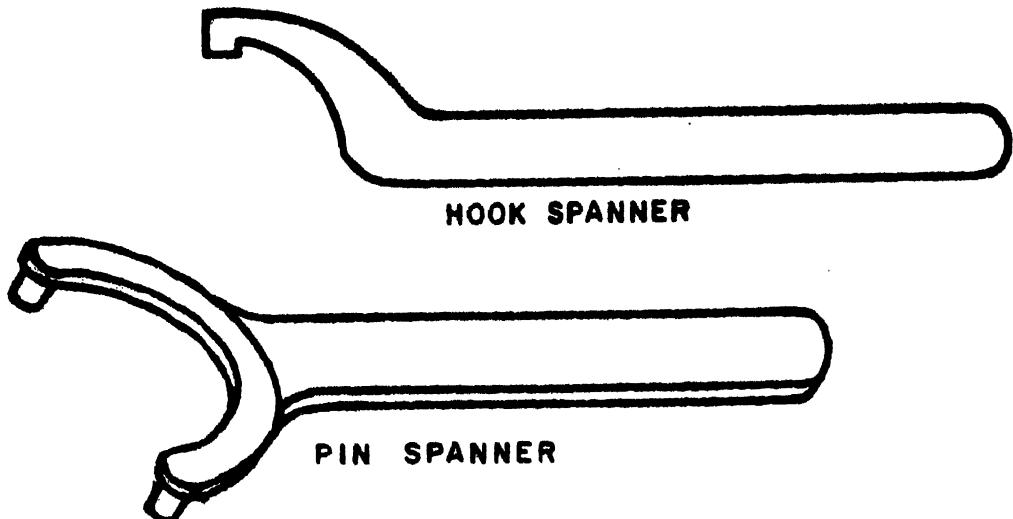
E. Allen Wrench



Used to _____

Wrench's are _____

F. Spanner wrench



Used to _____

V. Reason for using correct size wrenches.

A. _____

B. _____

VI. Socket sets

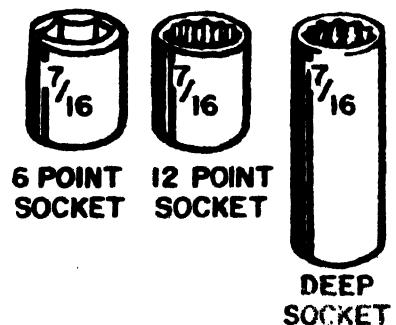
A. Sockets are designed to _____

Fits _____ and _____ the nut and bolts
heads.

B. Types of sockets

1. Shallow - _____

2. Deep - _____



VII. Sizing

A. Sized according to the _____
Sizes range from _____ to over _____ and are
also available in _____.

B. A complete socket set will be sized according to the
_____. Sockets designed for small nuts and
bolts will have a _____. Sockets designed
for medium and large nuts and bolts are
_____.

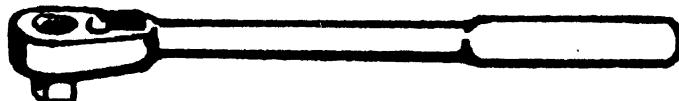
C. Always ensure the exact size socket is used _____
_____.

VIII. Socket handles are

_____.

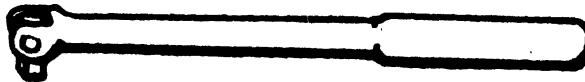
A. Types of handles.

1. Ratchet handle



Used for the _____
_____.

2. Hinged handle



Used to _____
_____.

3. Sliding "T" bar



Used for _____

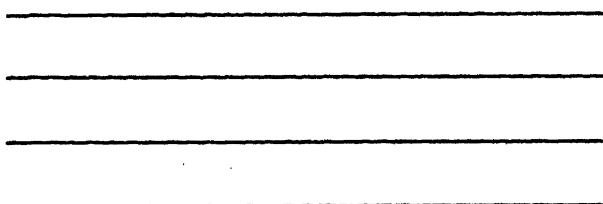
4. Speed handle



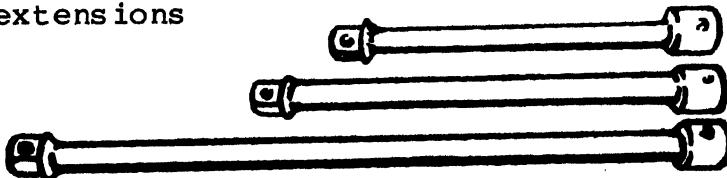
Used for _____

IX. Universal joints and bar extensions

A. Universal joints (U-joints)



B. Bar extensions



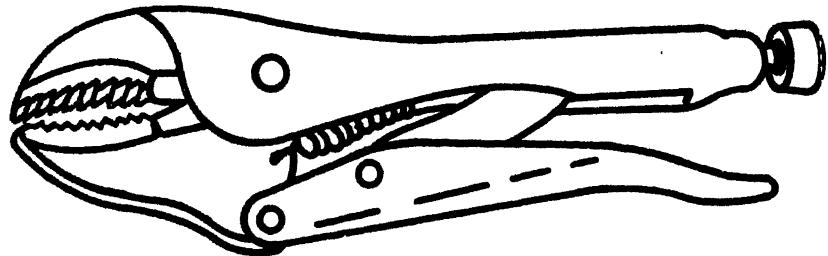
Designed to _____

X. Pliers

A. Designed purposes of pliers - _____

B. Types of pliers

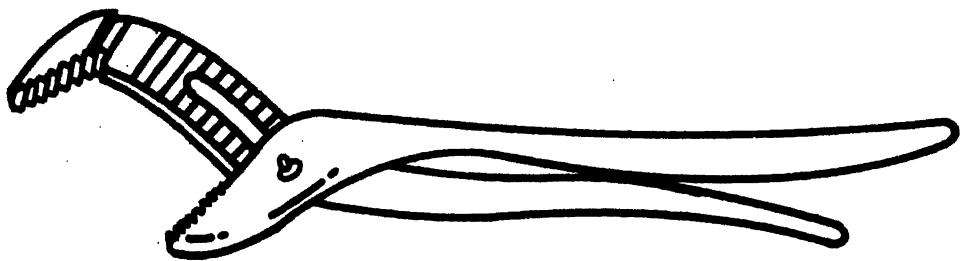
1. Vise grips



Used for _____

Not to be used on _____

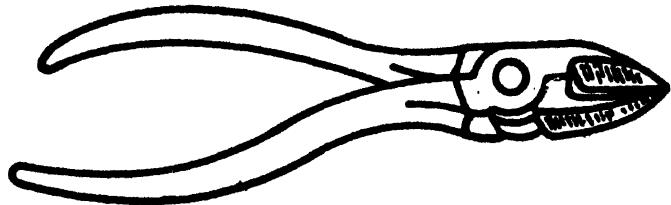
2. Channel locks



Used only when it is _____

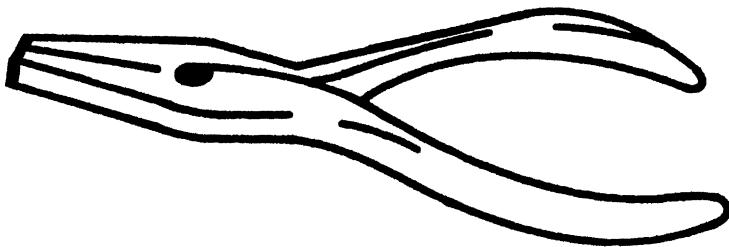
Improper use of channel locks can _____

3. Diagonal pliers (nikes)



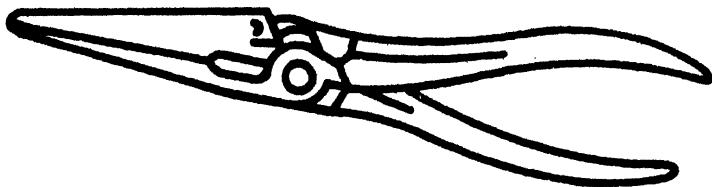
Used for _____

4. Duckbills



Used in _____

5. Needle-nose pliers



Used to hold _____

XI. Ball peen hammer

A. The ball peen hammer is used to _____



B. Most commonly used to _____

XII. Punches

A. Punches are held _____

B. Types of punches

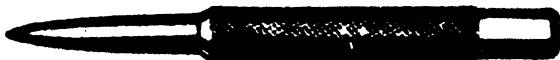
1. Center punch



Used for _____

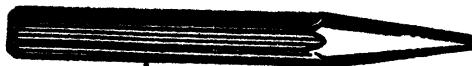
The point is _____

2. Prick punch



Used to make _____

3. Drift punch



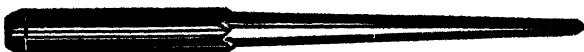
Used for _____

4. Pin punch



Used for _____
Use only _____
Never use this punch _____

5. Alignment punch



Used to _____

6. Gasket punch



Used for _____

XIII. Drill bit sizes

A. Drill bits are _____

1. _____

a. _____

b. _____

2. _____

a. _____

b. _____

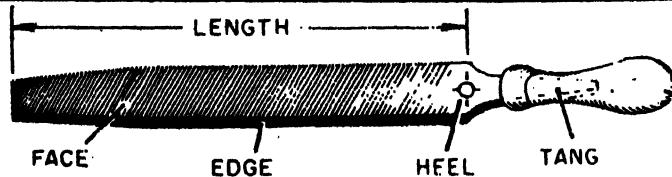
3. _____

a. _____

b. _____

B. _____

XIV. Files

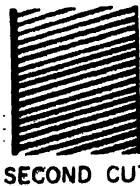


A. Cuts of files

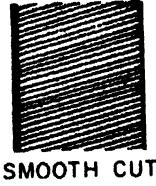
1. Single cut



BASTARD CUT



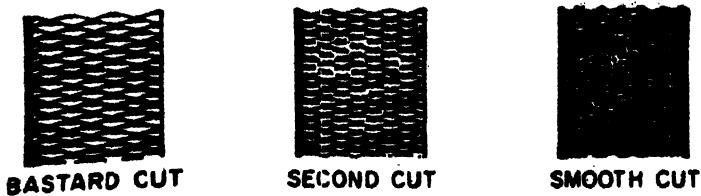
SECOND CUT



SMOOTH CUT

Used _____

2. Double cut



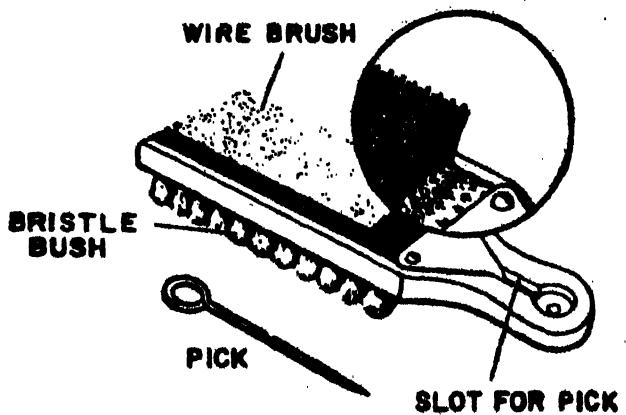
Used for _____

XV. B. Cross-sectional shapes



1. Triangular - _____
2. Mill - _____
3. Flat - _____
4. Square - _____
5. Round - _____
6. Half round - _____

XVI. Filecard



- A. Used to _____
- B. One side of the filecard has _____
the other is a _____

C. Cleaning is accomplished by _____

D. Use the _____ for loose shavings and the _____ for imbedded shavings.

XVII. Steel rule

A. Purpose - _____



Also available in _____

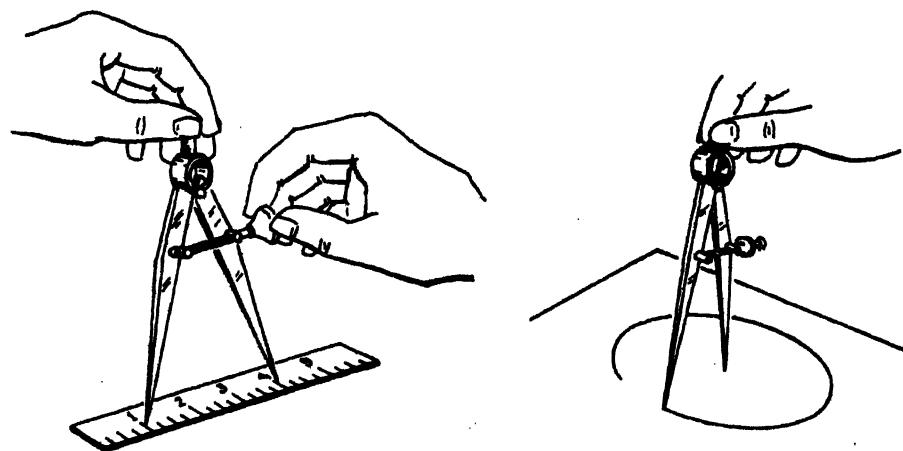
XVIII. Marking tools

A. Scribe



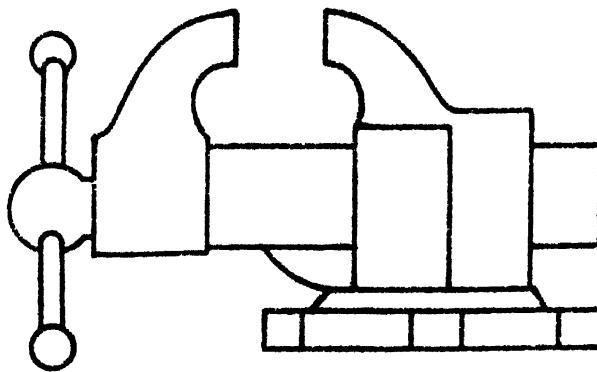
Used for _____

B. Dividers



XIX. Vise

A. Purpose - _____



B. Guidelines for proper care of a vise.

1. Keep vises _____
2. Wipe with _____
3. NEVER _____
4. Oil the _____
5. Move the _____
6. Leave handle _____

NOTETAKING SHEET 9.3.1N

AIRCRAFT HARDWARE

REFERENCES:

AVIATION STRUCTURAL MECHANIC 3 & 2, Chapter 6

NOTETAKING OUTLINE:

I. Types of Screws

A. Machine Screws

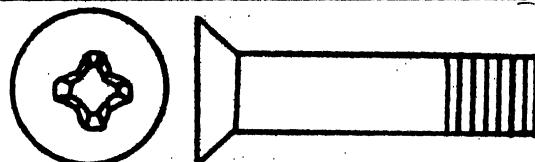
B. Structural Screws

C. Self-tapping Screws

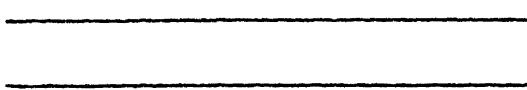
D. Set Screws

Types of Screwheads

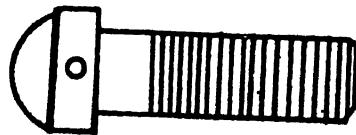
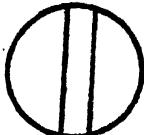
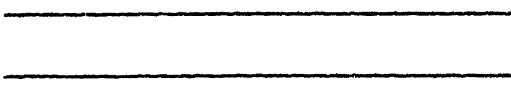
A. Flat Head



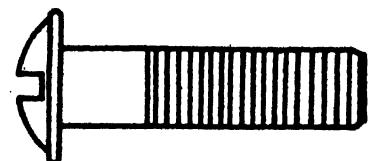
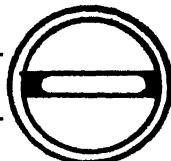
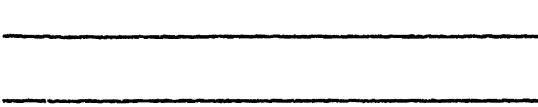
B. Round Head



C. Fillister Head

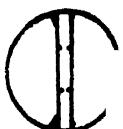
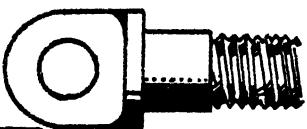
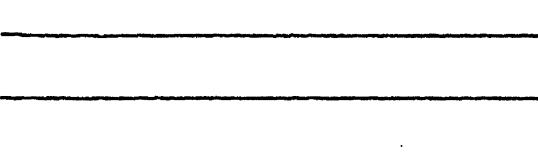


D. Washer Head

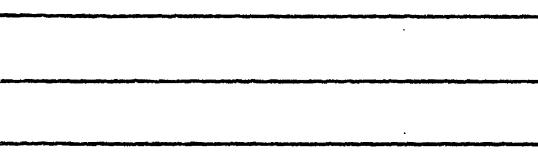


III. Aircraft Bolts

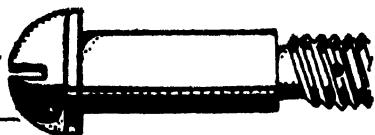
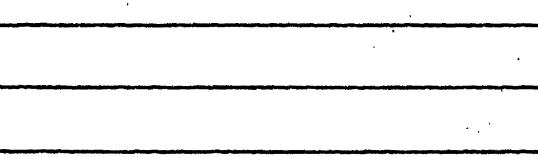
A. Eyebolts



B. Close Tolerance Bolts

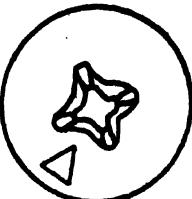
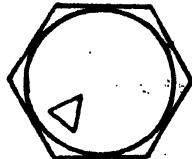
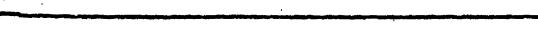


C. Clevis Bolts

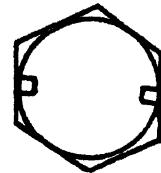


IV. Bolt Head Markings/Description

A. Steel-Close Tolerance

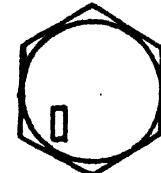


B. Aluminum Alloy



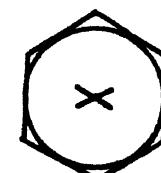
Tensile strength _____

C. Corrosion Resistant



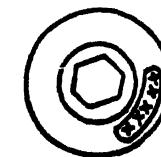
Tensile strength _____

D. Steel



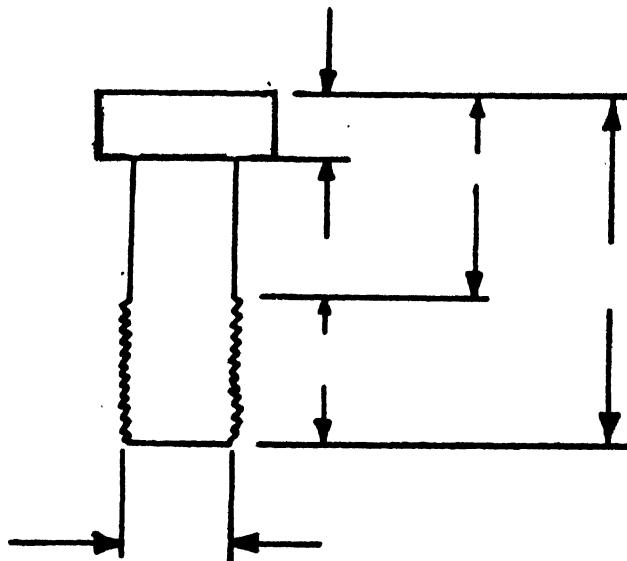
Tensile strength _____

E. Steel



Tensile strength _____

V. Bolt Dimension Terms



A. Head - _____

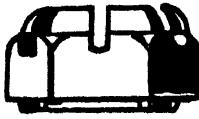
B. Grip - _____

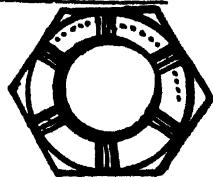
C. Threads - _____

D. Length - _____

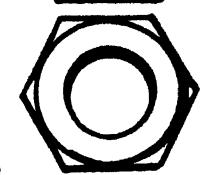
E. Diameter _____

VI. Nuts and their purpose

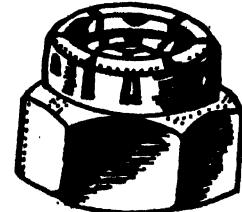
A. Castle Nuts - 



B. Plain Nuts - 



C. Wing Nuts - 

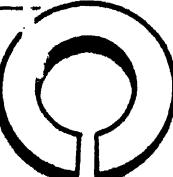


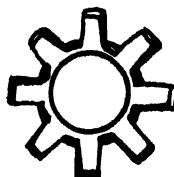
D. Self-locking Nuts - 

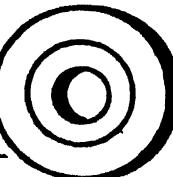
VII. Washers and their purpose

A. Plain Washer 



B. Lockwashers 

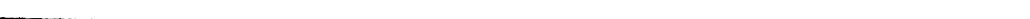


C. Special Washers 



VIII. Turnlock Fasteners

A. Designed purpose - 



B. Types

1. Dzus (ZOO's) - 

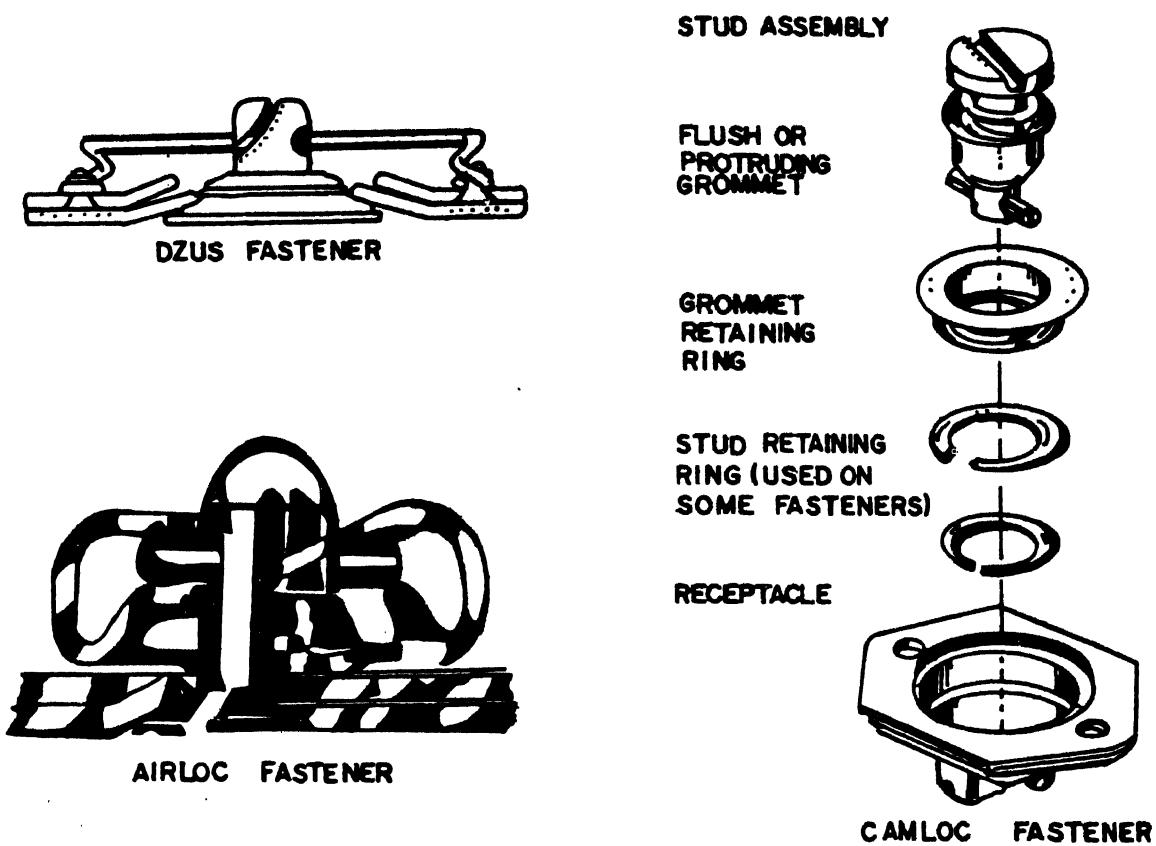
2. Camlock - _____

3. Air Lock - _____

IX. Bonding Wire

A. Purpose - _____

B. Assemblies - _____



NOTETAKING SHEET 9.4.1N

TORQUING AND SAFETYING

REFERENCES:

1. AVIATION STRUCTURAL MECHANIC (S) 3 & 2, NAVTRA 10308-C, Chapter 6
2. TOOLS AND THEIR USES, NAVPERS 10085-B, Chapter 1

NOTETAKING OUTLINE:

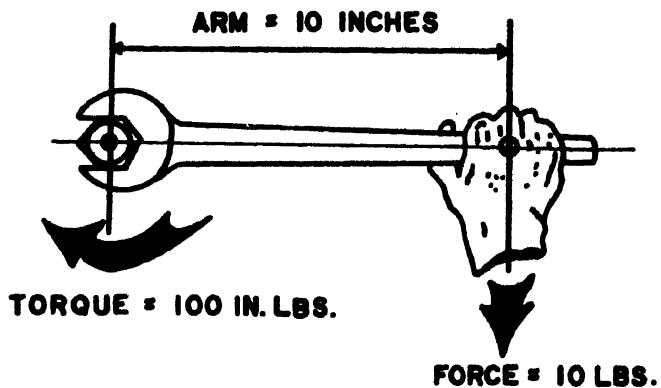
I. Torquing

A. Definition _____

1. Measured by the force times the perpendicular distance from the line of action and is equal to the amount of torque. ($F \times D = T$)

2. Force - _____

Perpendicular Distance - _____



B. Units of Torque Measurement

1. Torque is measured in _____ (ounces or pounds) and the _____ (inch or foot).

a. Inch pounds - _____

b. Foot pounds - _____

2. Measurements are determined by applying the force and the perpendicular distance formula.

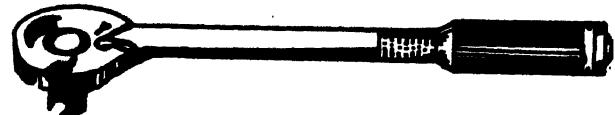
C. Manuals for Torque Value Information

1. Torque values are specified for each piece of hardware in the applicable _____.

2. Additional torque information and what is considered the governing manual is the _____.

D. Types of Torque Wrenches

1. Micrometer Setting -

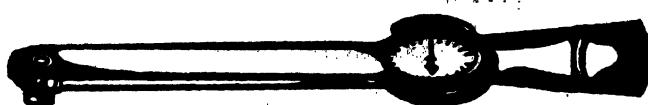


a. _____

b. _____

c. _____

2. Dial Indicating -



a. _____

b. _____

c. _____

3. When selecting a torque wrench, _____

E. Recalibrating Torque Wrenches

1. When to recalibrate

a. _____

b. _____

2. The Quality Assurance Branch will maintain _____

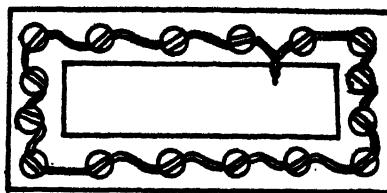
II. Safetying

A. Safetying is _____

B. Methods

B. Methods

1. Lockwiring -



a. Styles of wiring -



b. General Rules to Follow

(1) Pigtail should be

(2) NEVER

(3) Safety wire must be

(4) Wire must be applied so that

2. Cotter Pinning -

General rules for cotter pinning

a. Cotter pins should

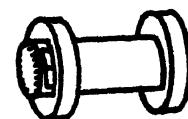
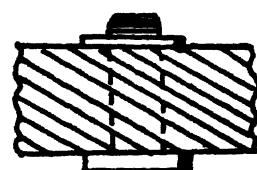
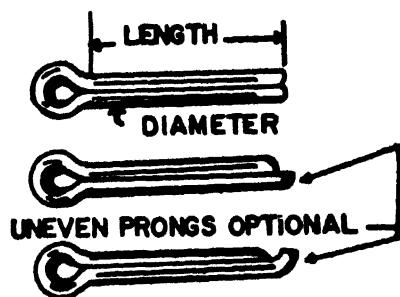
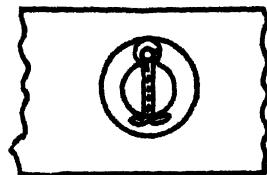
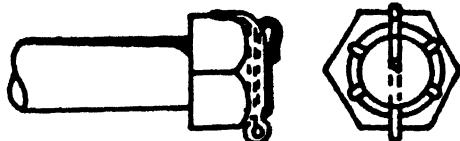
b. The prong bent over the bolt end should

c. The prong bent down should

d. If the wrap around method is used,

e. All prongs should be bent over at a _____

Sharp angled bends _____



JOB SHEET 9.5.1J

FOR

SHOP PROJECT 1

INTRODUCTION:

In this job program, you will use dividers, punches, drills, screwdrivers, wrenches, a vise, file, filecard, steel rule, scriber, and ball peen hammer. This shop project will require you to prepare a sheet metal plate, approximately 4" x 4", for installation on the shop fixture. This will involve laying out the sheet metal, filing, drilling, and using different hardware. IT IS VERY IMPORTANT TO READ DIRECTIONS CAREFULLY. Failure to do so will result in work that is "UNSATISFACTORY". Carefully check and recheck all instructions before proceeding to the next step. Always inventory your tools, before and after your work. ALWAYS WEAR GOGGLES WHEN WORKING ON THE SHOP PROJECT. Put goggles on at this time.

LESSON TOPIC LEARNING OBJECTIVE:

- 9.0. FABRICATE and INSTALL a sheet metal plate onto a given shop fixture, using tools, hardware, and job program provided. All procedures and safety precautions must be observed in accordance with the job program.

REFERENCES:

1. Airman. NAVEDTRA 10307-E. Chapter 10, pages 199-202.
2. Tools and Their Uses. NAVPERS 10085-B.

EQUIPMENT AND MATERIALS:

1. Bench vise
2. Hand drill
3. No. 30 twist drill
4. No. 9 twist drill
5. 17/64-inch twist drill with wooden handles (deburring tool)
6. Standard straight-slot screwdriver, 6-inch

7. Phillips screwdriver, 6-inch
8. File
9. File card
10. Ball peen hammer
11. Center punch
12. Prick punch
13. Steel rule
14. Scriber
15. Dividers
16. 3/8-inch combination wrench
17. Two 1/2-inch combination wrenches
18. Six 10-32 Fillister-head screws
19. Two 10-32 Phillips-head screws
20. Eight 10-32 self-locking nuts
21. Sixteen 3/16-inch flat washers
22. Six 5/16-inch drilled hex-head bolts
23. Three 5/16-inch self-locking nuts
24. Three 5/16-inch castellated nuts
25. Twenty-four 5/16-inch flat washers
26. Shop fixture
27. Steel backup plate
28. Sheet metal plate
29. Goggles

WINGS, CAUTIONS, NOTES, AND STOPS

following definitions apply to WARNINGS, CAUTIONS, NOTES, AND STOPS found throughout the job program.



edes an operating procedure, practice, condition, etc., that result in injury or death if not carefully followed or rved.



edes an operating procedure, practice, condition, etc., that result in damage to equipment if not carefully followed or rved.

* NOTE *

erating procedure, practice, condition, etc., for which sis is essential.



proceed until you are directed by an instructor, and the ictor has initialed the job sheet.

SAFETY PRECAUTIONS:

1. Sheet metal has sharp edges and burrs that could inflict painful cuts and gouges in the skin.
2. Report any injury IMMEDIATELY to your instructor.
3. Inventory your tools prior to beginning your project. Inventory your tools again after the project has been completed.

PROCEDURAL STEPS:

STEP 1: Remove sharp edges on the sheet metal plate.

WARNING

Sheet metal has sharp edges. Handle carefully.

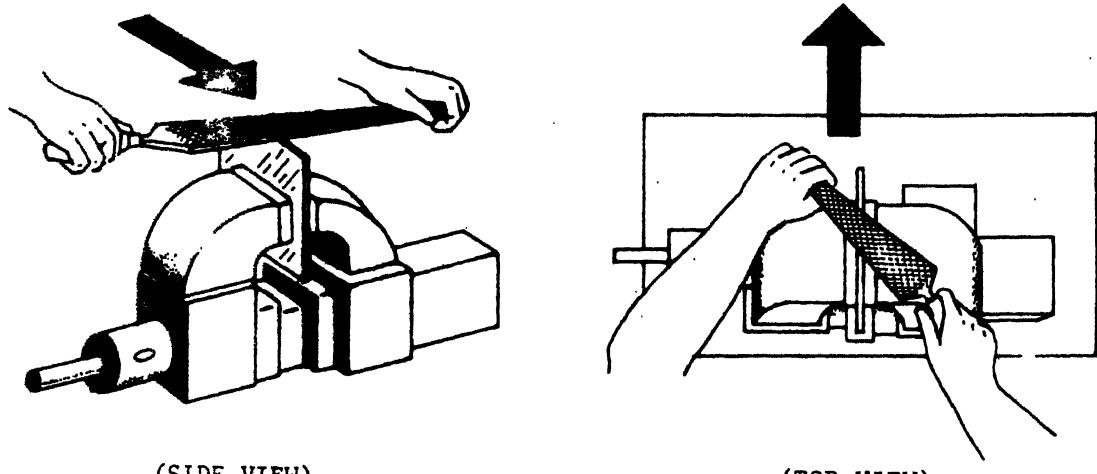


FIGURE 1

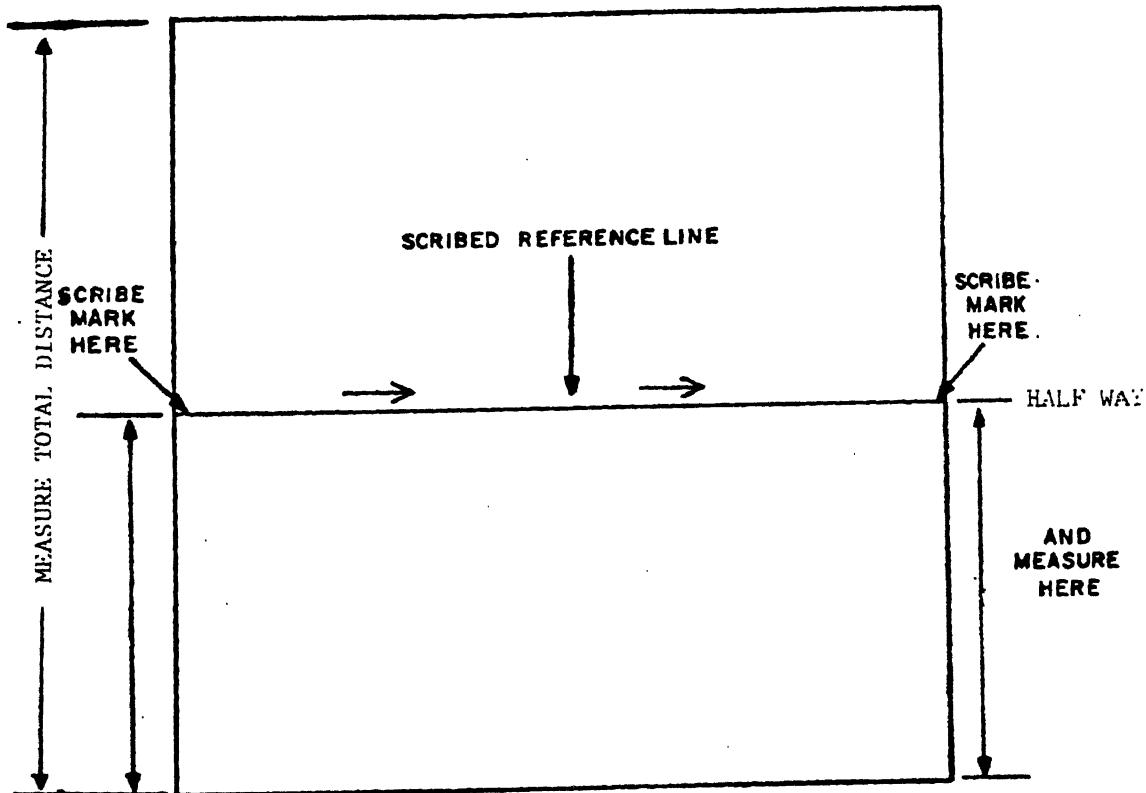
- a. Secure sheet metal plate in vise.
- b. Select a flat file from the tool board.
- c. With a flat file, take slow, full-length, steady strokes.
- d. Hold the file at an angle while pushing down lightly with the left hand and forward with both.

NOTE

- *(1) The file cuts as you push; LIFT UP ON RETURN stroke.
- *(2) DO NOT remove corners at this time. See figure 1.

- e. With a flat file, lightly file edges of plate to remove burrs.
- f. Repeat steps a thru d on ALL remaining edges of the plate.

STEP 2: Scribe a reference line.



(Sheet Metal Plate)

FIGURE 2

- a. Select a scriber and steel rule form the tool board.
- b. With a steel rule, measure the total height from corner to corner of the plate.
- c. Divide the total height by two.
- d. Measure up from the lower left hand corner of the plate, using the figure indicated in step c. and scribe a small mark. See figure 2.

NOTE

*DO NOT rotate plate.

- e. Repeat step d. for the right hand side of the plate. See figure 2.
- f. With a steel rule and scribe, draw a line connecting the two scribed marks.

NOTE

- *(1) Press down firmly with scriber when drawing line.
- *(2) Do NOT retrace scribe line. See figure 2.

STEP 3: Find the center of the reference line.

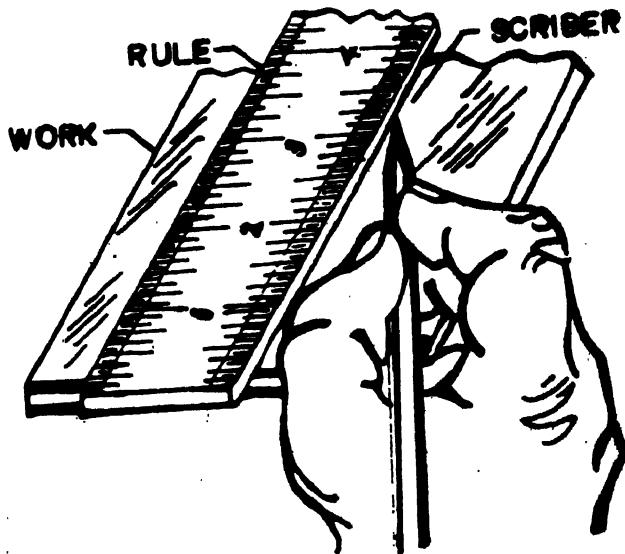


FIGURE 3

- a. With a steel rule, measure the length of the line scribed in step 2f.
- b. Divide the measured length by 2.
- c. With a scriber, make a small mark at that point.
See figure 3.
- d. Return scriber to proper location on the tool board.

STEP 4: PRICK-punch the center point.

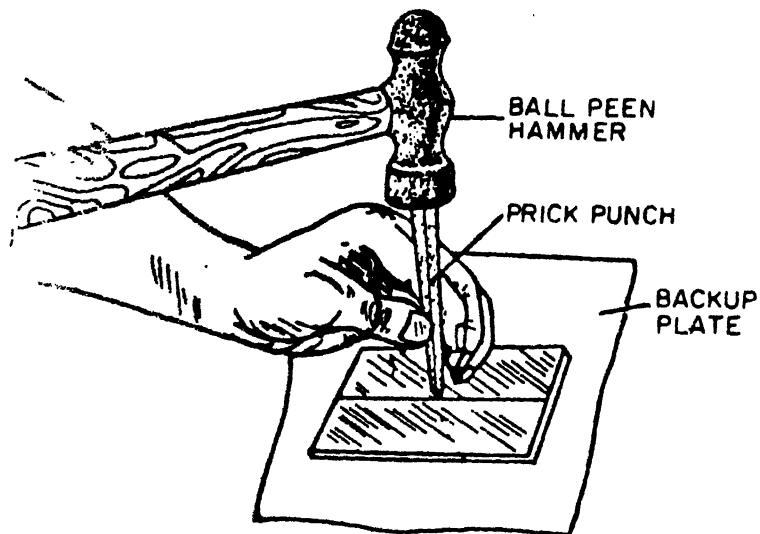


FIGURE 4

- a. Place a backup plate under the sheet metal plate.
- b. Select a ball peen hammer and a prick punch from the tool board.
- c. Hold the prick punch at a right angle, on the scribed center mark.
- d. Using the flat face of the ball peen hammer, lightly and squarely strike the prick punch once. See Figure 4.

STEP 5. Round the corners of the plate.

WARNING

Plate has SHARP pointed edges. Handle carefully.

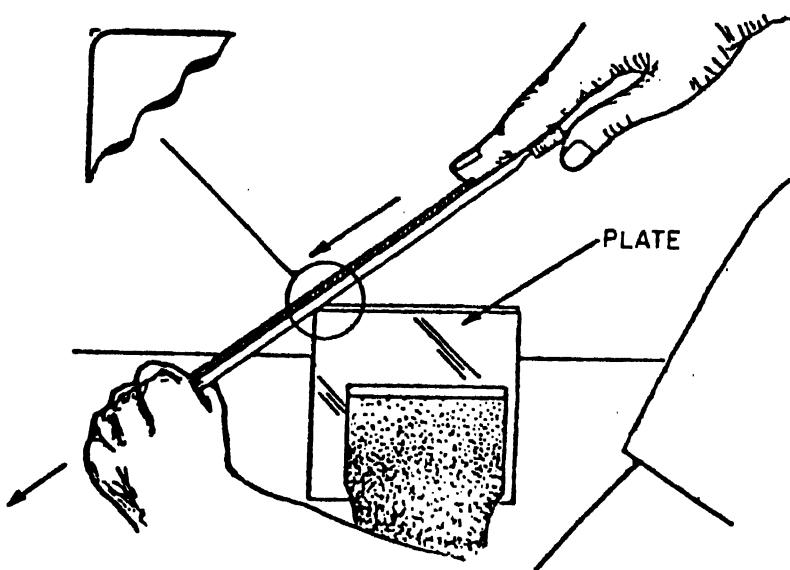


FIGURE 5

- a. Secure the plate firmly in the vise.
- b. Hold the flat file in line with the edge of the plate.
- c. Slightly round each corner of the plate.

NOTE

*(1) Plate must be repositioned for each corner to be rounded.

*(2) Check corners after filing to ensure removal of sharp edges. See figure 5.

- d. Remove plate from vise.
- e. Return flat file to proper location on tool board.

Accuracy in performing the next three steps is very important in order to ensure proper alignment of the plate with the shop fixture.

STEP 6: Lay out a circle.

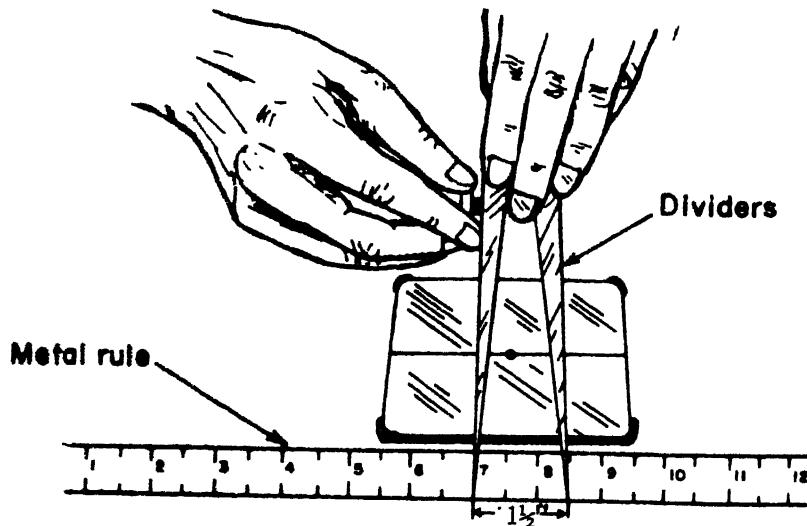
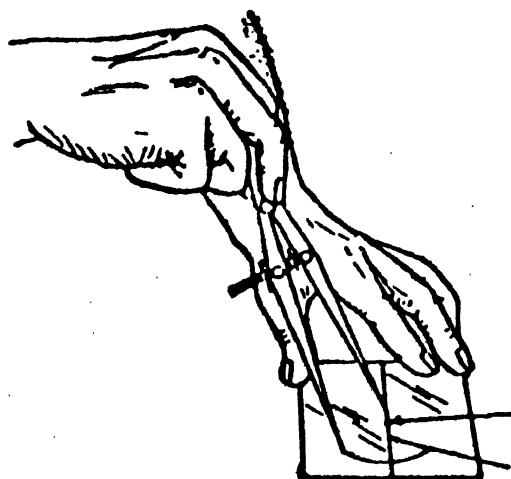


FIGURE 6

- a. Select a pair of dividers from the tool board.
- b. With one leg of the dividers on an inch mark of the steel rule, adjust dividers to 1 1/2 - inches. See figure 6.
- c. Place one leg of the dividers on the punch mark, located in the center of your plate.
- d. Scribe a circle by holding the dividers by the knob, leaning dividers slightly in the direction of rotation. See figure 7.



NOTE: DO NOT RETRACE
THE SCRIBED CIRCLE.

PRICK PUNCH MARK

CENTER REFERENCE LINE

FIGURE 7

STEP 7: Divide the circle into six equal segments.

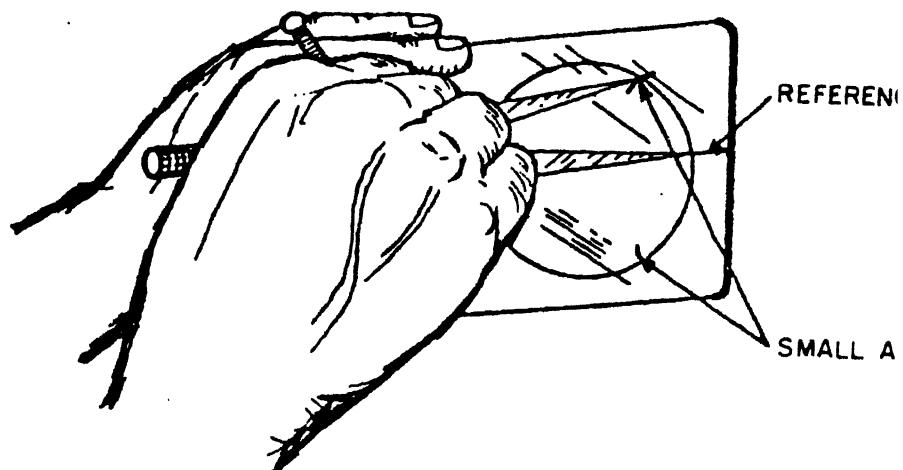


FIGURE 8

- Place a backup plate under your work.
- With a ball peen hammer and a prick punch, lightly and squarely punch both points where the reference line intersects the circle on the plate.
- With the dividers still set at 1 1/2 - inches, place one leg on either of the punchmarks made in STEP 7b.
- Using the dividers, scribe a small arc that intersects the circle on both sides of the reference line. See figure 8.
- Repeat steps c and d for remaining punchmark.
- With a ball peen hammer and a prick punch, lightly and squarely punch the arcs at the four points where they intersect the circle.
- Close the dividers and return the dividers, the steel rule, and the prick punch to their proper locations on the tool board.

STEP 8: CENTER-punch points on sheet metal plate.

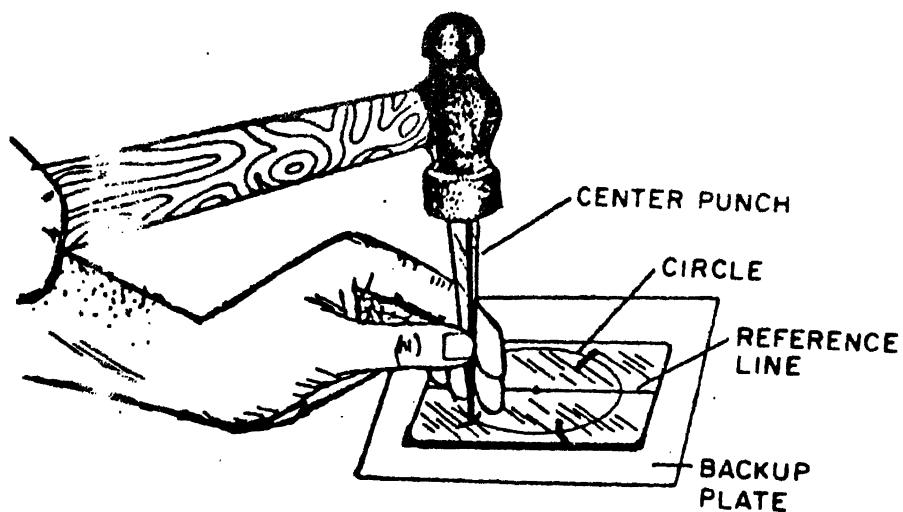


FIGURE 9

- a. Place a backup plate under sheet metal plate.
- b. Select the center punch from the tool board.
- c. Center-punch the arcs at the four points where they intersect the circle.

NOTE

*(1) Hold center punch at a right angle to the plate.

*(2) Using flat face of the ball peen hammer, squarely strike the center punch once. See figure 9.

- d. Center-punch the two points that are intersected by the reference line and the circle.
- e. Return hammer and punch to proper locations on the tool board.

STOP

Have your sheet metal plate checked by a shop instructor

Instructor Initials

STEP 9: Install twist drill in the chuck.

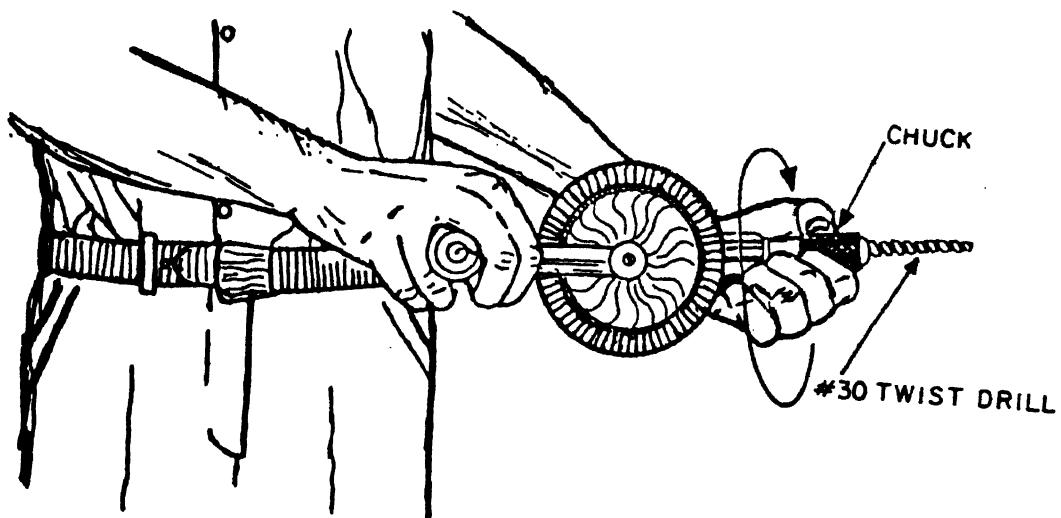


FIGURE 10

- a. Select the hand drill and a No. 30 twist from the tool board.
- b. Insert the No. 30 twist drill into the chuck on the hand drill.
- c. Hold the hand drill firmly; tighten by rotating the chuck.
See figure 10.



Do not bend the drill handle.

STEP 10: Secure sheet metal plate in the vise.

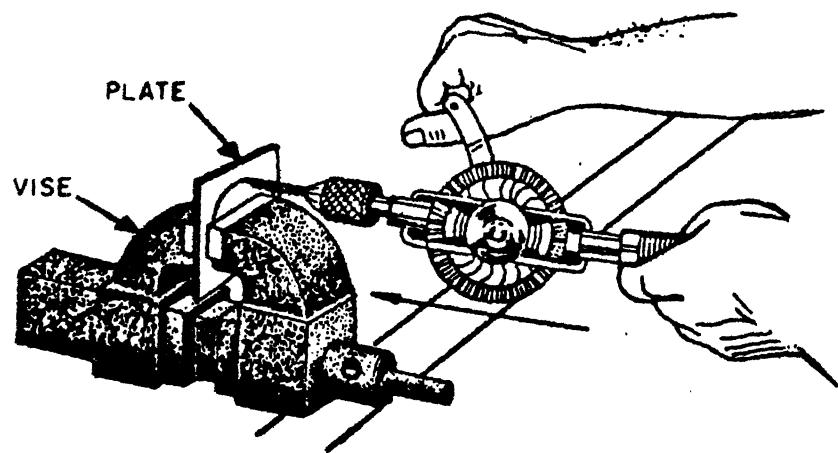


FIGURE 11

- a. Position the plate so that the hole to be drilled is close to the jaws of the vise. This prevents the plate from bending and ensures an evenly drilled hole.
See figure 11.
- b. Tighten the plate securely in the vise.

STEP 11: Pilot-drill center-punched marks on the sheet metal plate.

- a. Using the hand drill fitted with a No. 30 twist drill, drill only ONE of the six center-punched marks on the circle. See figure 11.

NOTE

*(1) Keep the drill at a right angle to your work.

*(2) Use light pressure on the twist drill to cut a clean hole.

*(3) Do NOT drill punchmark located in the center of the plate.



Have drilled hole checked by a shop instructor.

Instructor Initials

- b. Repeat for the remaining five center-punched marks on the circle.
- c. Remove sheet metal plate from vise.
- d. Remove the No. 30 twist drill and return it to proper location on tool board.

STEP 12: Enlarge drilled pilot holes in the sheet metal plate.

- a. Select the No. 9 twist drill from the tool board.
- b. Install the No. 9 twist drill in the chuck as in STEP 9.
- c. Using the hand drill fitted with the No. 9 twist drill, redrill only the six pilot holes around the circle on the plate.



Reposition plate after enlarging each hole so that the next hole is close to the vise jaws.

- d. Remove the No. 9 twist drill from the hand drill.
- e. Return hand drill and twist drill to the proper locations on the tool board.

STEP 13: Remove burrs from drilled holes in plate.

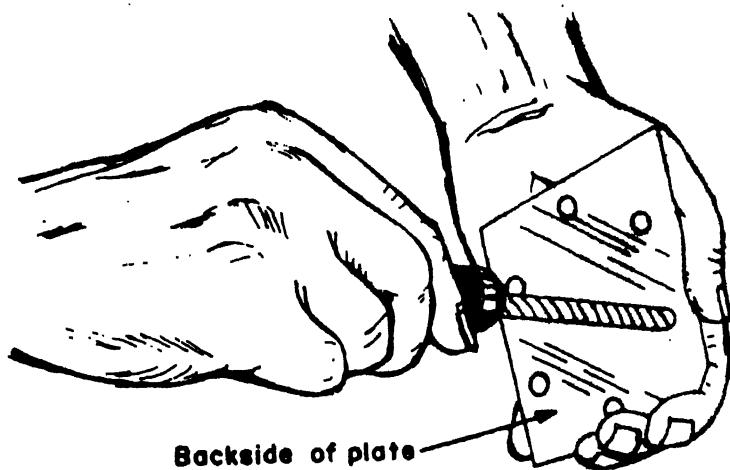


FIGURE 12

- a. Select the 17/64-inch twist drill fitted with a wooden handle from the tool board.

WARNING

Do NOT force twist drill. Personal injury to palm of hand could result.

- b. On the backside of the drilled plate, place the twist drill against each hole.
- c. GENTLY, twist by hand, as necessary, to remove burrs from edge of each hole. See figure 12.
- d. Return fitted twist drill to the proper location on the tool board.



Have sheet metal plate checked by an instructor.

Instructor Initials

STEP 14: Install plate to the center of the shop fixture.

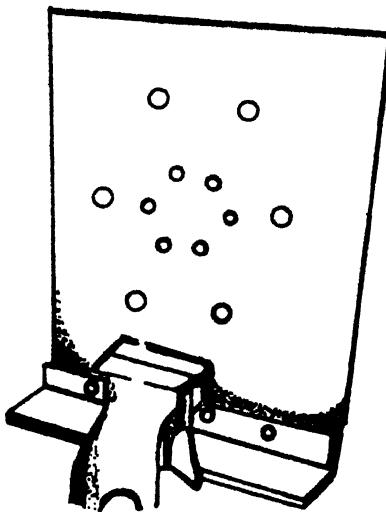


FIGURE 13

- a. Clamp the shop fixture vertically in the vise.

See figure 13.

NOTE

*When installing the fillister head screws, in this project, the screw should be secured with the drilled passage pointing toward the center of the plate. The 5/16 hex head bolts should be secured with the drilled passage in the bolthead parallel to the base of the fixture. Figure 14 illustrates completion of the following steps.

- b. Insert one 10-32 fillister-head screw through one 3/16-in flat washer.
- c. Place sheet metal plate against the shop fixture and align holes in the plate with holes in the shop fixture.

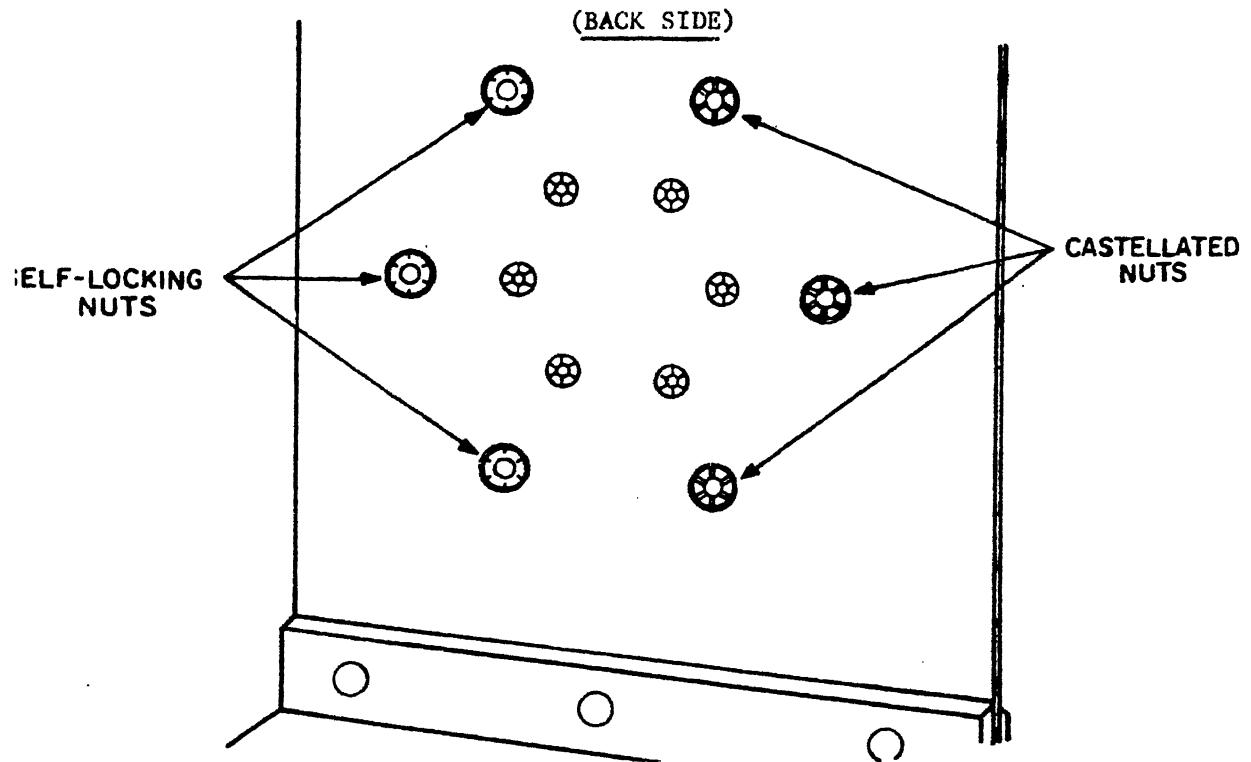


FIGURE 14

- d. Insert screw with washer through any aligned hole, with the head of the screw on the plate side of the fixture.
- e. Install one 3/16-inch flat washer on inserted screw.
- f. Secure (DO NOT TIGHTEN) inserted screw with washers to plate and fixture, using one 10-32 inch self-locking nut.
- g. Repeat steps b through f for the remaining five holes in the plate.
- h. Select a standard screwdriver and a 3/8-inch combination wrench from the tool board.
- i. Tighten the nuts on the screws, using the straight slot screwdriver and a 3/8-inch combination wrench. REMEMBER screws must be secured with drilled passage pointing toward the center of the plate.
- j. Return screwdriver and wrench to proper locations on the tool board.

STEP 15: Install hex-head in outer drilled holes in shop fixture.

- a. Insert one 5/16-inch drilled-shank, hex-head bolt through two 5/16-inch flat washers.

NOTE

*The use of two washers under the head or nut of any bolt is a nonstandard practice in naval aviation. It is done in this school to make up for the length of the bolt in use.

- b. Place bolt and washers through any large outer hole, with the head of the bolt on the plate side of the fixture.
- c. Install two 5/16-inch flat washers on inserted bolt.
- d. Secure inserted bolt with washers to the fixture, using one 5/16-inch self-locking nut.

NOTE

*Secure three of the bolts with 5/16-inch self-locking nuts. Use 5/16-inch castellated nuts on the remaining three bolts. See figure 14.

- e. Repeat steps a through d for the remaining five large holes in the shop fixture.
- f. Select two 1/2-inch combination wrenches from the tool board.
- g. Tighten the nuts on the bolts, using the two 1/2-inch combination wrenches. REMEMBER bolts must be secured with the drilled passage in the bolthead parallel to the base of the fixture.
- h. Return wrenches to proper locations on the tool board.

STEP 16: Install Phillips-head screws to the shop fixture.

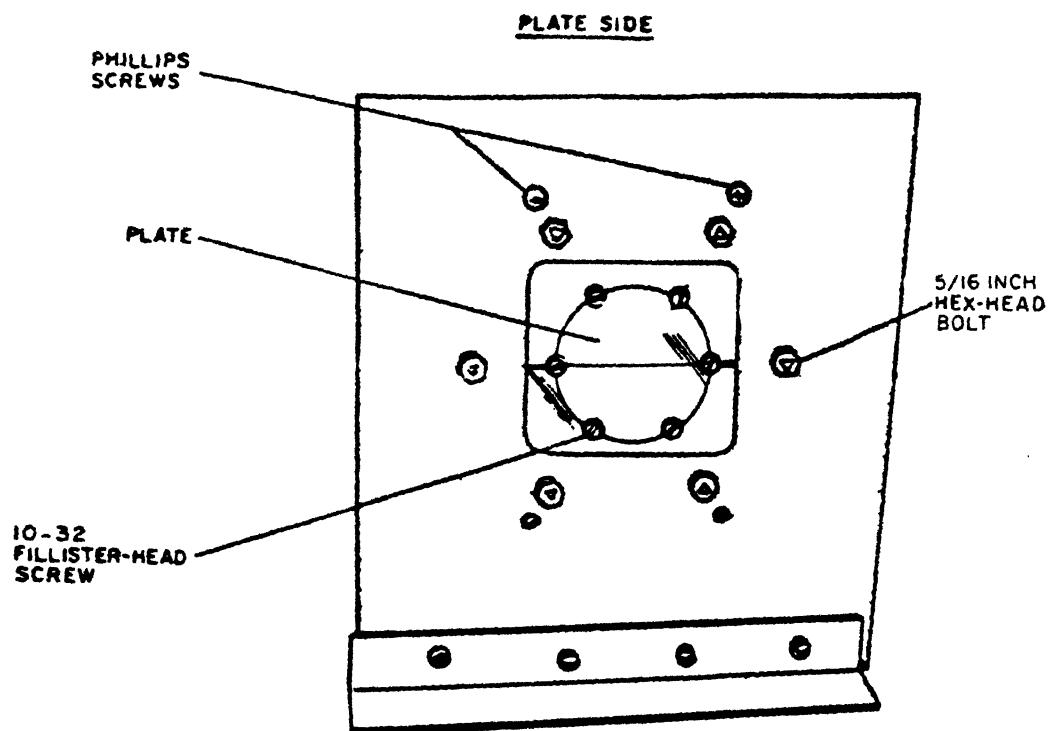
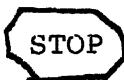


FIGURE 15

- a. Insert one Phillips-head screw through one 3/16-inch flat washer.
- b. Place screw and washer through one of the remaining holes with the head of the screw on the plate side of the fixture. See figure 15.
- c. Install one 3/16-inch flat washer on inserted screw.
- d. Secure inserted screw with washers, using one 10-32-inch self-locking nut.
- e. Repeat steps a through d for one additional Phillips-head screw.
- f. Select a Phillips screwdriver and a 3/8-inch combination wrench from the tool board.
- g. Tighten nuts snugly on the screws, using the screwdriver and the 3/8-inch combination wrench.

h. Return screwdriver and wrench to the proper locations on tool board.



Instructor Initials

1. Have work checked by a shop instructor.
2. Inventory all tools.
3. Having completed Job Program I, proceed to Job Program II.

JOB SHEET 9.5.2J

SHOP PROJECT 2

INTRODUCTION:

In this job program, you will review and practice the use of a torque wrench, lockwire, and cotter pins. It is very important to read directions carefully. Failure to do so will result in work that is "unsatisfactory." Very carefully check and recheck all instructions before proceeding to the next step. Always inventory your tools, before and after your work. ALWAYS WEAR GOGGLES WHEN WORKING ON THE SHOP PROJECT. Put goggles on at this time. Safetying is a process of securing aircraft parts such as bolts, nuts, machine screws, capscrews, studs, and other fastenings so that they will not work loose as a result of vibrations. Loose bolts, nuts, or screws can ruin engines or cause parts of the aircraft to drop off. Careless safetying is a sure course to disaster. There are various methods of safetying aircraft parts. The most widely used are lockwire, cotter pins, and special nuts, such as self-locking nuts.

LESSON TOPIC LEARNING OBJECTIVE:

9.0. FABRICATE and INSTALL a sheet metal plate onto a given shop fixture, using tools, hardware, and job program provided. All procedures and safety precautions must be observed in accordance with the job program.

REFERENCES:

1. Airman. NAVEDTRA 10307-E. Chapter 10, pages 199-202.
2. Tools and Their Uses. NAVPERS 10085-B. Chapter 1, pages 9-11.

EQUIPMENT AND MATERIALS:

1. Shop fixture
2. Bench vise
3. 3/8 inch drive, dial, torque wrench
4. Two 1/2-inch combination wrenches
5. 3/8-inch combination wrench
6. 3/8-inch drive, 1/2-inch socket

7. Diagonal cutting pliers
8. Duckbill pliers
9. Three cotter pins
10. Lockwire, MS-20995N32 (0.032)
11. Steel rule
12. Goggles

WARNINGS, CAUTIONS, NOTES, AND STOPS

The following definitions apply to warnings, cautions, notes, and stops found throughout the job program.

WARNING

Precedes operating procedures, practices, conditions, etc., that could result in injury or death if not carefully followed or observed.

CAUTION

Precedes operating procedures, practices, conditions, etc., that could result in damage to equipment if not carefully followed or observed.

NOTE

Precedes operating procedures, practices, conditions, etc., for which emphasis is essential.

STOP

DO NOT proceed until you are directed by an instructor, and the instructor has initialed the job sheet.

There are times when, for engineering reasons, a definite force must be applied to a nut or bolthead. In such cases, a torque wrench must be used.

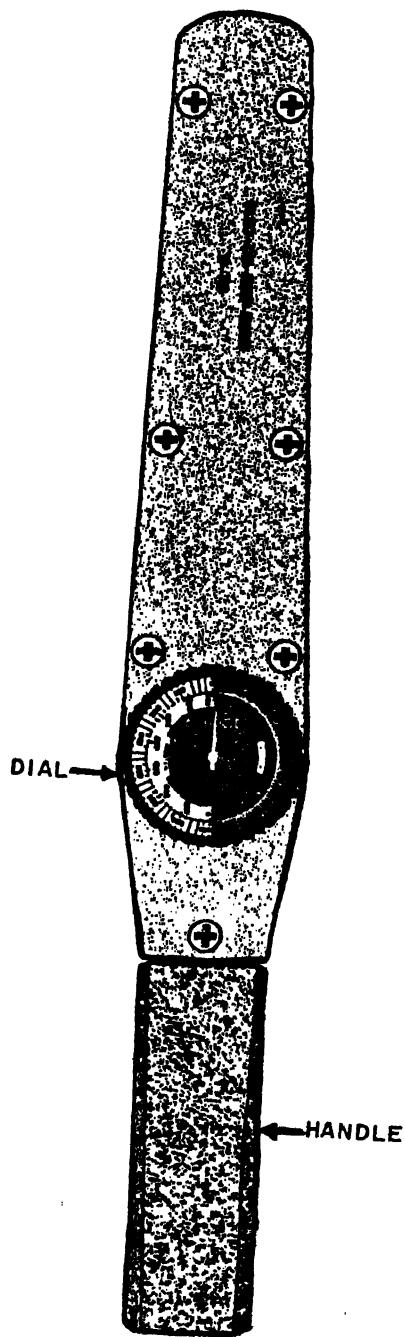
SAFETY PRECAUTIONS:

1. Always pull a torque wrench toward you--never push on a torque wrench.
2. Never drop or mishandle a torque wrench.
3. DO NOT use the torque wrench to loosen bolts, nuts, or screws that have been previously tightened.
4. DO NOT use the torque wrench for anything except measuring torque.
5. ALWAYS wear goggles to protect your eyes.
6. Report any injury immediately to your instructor.
7. Inventory your tools prior to beginning your project. Inventory your tools again after the project has been completed.

JOB STEPS:

STEP 1: Identify and make initial settings on a dial torque wrench.

- a. Obtain a dial indicator torque wrench and a 1/2-inch (3/8-drive) socket from a shop instructor.
- b. Examine closely and compare the wrench with the illustration in figure 1.



1--DIAL INDICATOR TORQUE WRENCH

c. Turn the bezel until the main pointer is lined up with the SILVER ZERO of the inner graduation on the BLACK portion of the dial.

* NOTE *

*Torque values are marked inside the circle. Each mark is 10 inch-pounds. See figure 2.

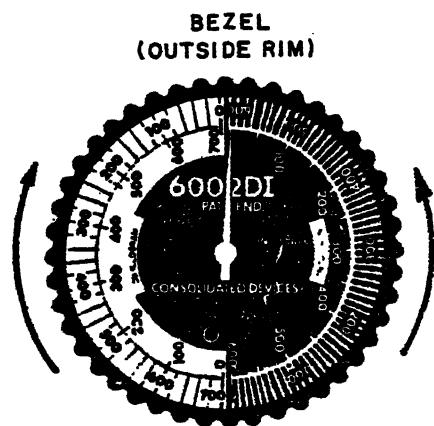


FIGURE 2.--Torque wrench dial.

d. Install 1/2-inch (3/8-drive) socket on the torque wrench.

STEP 2: Apply torque to the self-locking nuts.

- a. Clamp the shop fixture firmly into bench vice in a horizontal position (boltheads down). See figure

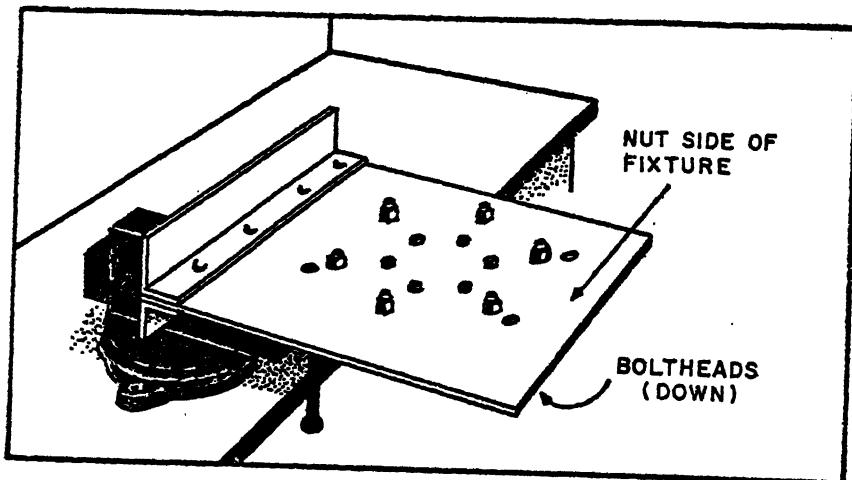


FIGURE 3

WARNING

Ensure that the vise is holding the fixture tightly in place.

- b. Select 1/2-inch combination wrench from the tool board.
- c. Hold the head of a bolt secured with a self-locking nut, using the box end of a 1/2-inch combination wrench.
- d. Place the torque wrench on the self-locking nut and with a smooth steady motion, pull in a clockwise direction until the torque value is 165 inch-pounds. See figure 4.

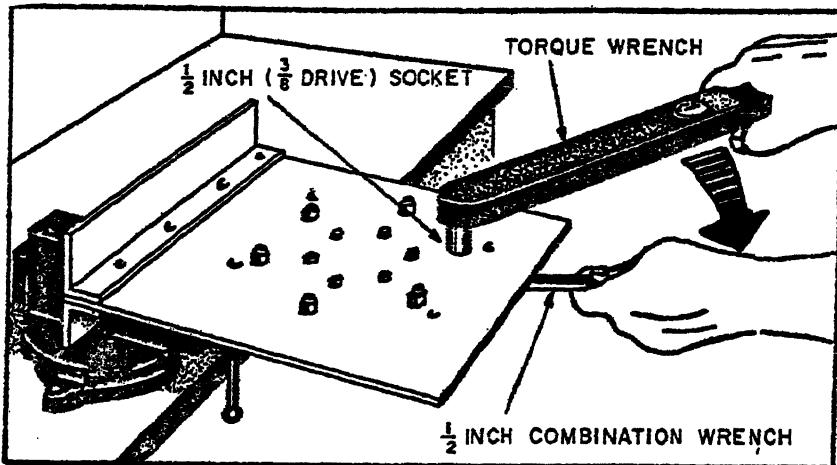


FIGURE 4

WARNING

Keep a firm grip on Handtools. Misuse can cause personal injury.

- e. Repeat steps 2c and 2d for the remaining two self-locking nuts.

STEP 3: Apply torque to castellated nuts.

- a. Hold the head of a bolt secured with a castellated nut, using the box end of a 1/2-inch combination wrench.

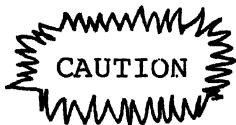
* NOTE *

- * Castellated nuts are tightened to a torque value of 130 - 190 inch-pounds.
- b. Place the torque wrench on the castellated nut and with a steady pull, tighten the nut to the low limit of the torque range (130 inch-pounds). See figure 4.

- c. Remove the torque wrench and check to see if the passageway in the bolt shank is aligned with the slot in the nut.
- d. If passageway and slot are aligned, repeat steps 3a through 3c on the remaining two castellated nuts.

* NOTE *

- *(1) If passageway and slot are not aligned, reapply the torque wrench and slowly tighten the nut toward the maximum value of torque (190 inch - pounds).
- *(2) Occasionally remove the torque wrench to check alignment.
- *(3) If the slot of the nut does not align with the drilled bolt shank when maximum torque is reached, the nut must be removed and replaced with a different nut; then, repeat steps 3a through 3c.



Do not exceed maximum torque.



Have your work checked by a shop instructor.

Instructor Initials

* NOTE *

- *(1) Return the torque wrench and 1/2-inch (3/8-drive) socket to the appropriate place.
- *(2) Return 1/2-inch combination wrench to proper location on tool board.
- *(3) This completes the torque section of this job program.

COTTER PIN SAFETYING

Cotter pins are used to secure castellated nuts on bolts that have drilled shanks.

SAFETY PRECAUTIONS:

1. Cut all cotter pins at right angles. Leave no sharp points.
2. Always cup the cotter pin with your hand when cutting to prevent personal injury or FOD.
3. ALWAYS wear goggles to protect your eyes.
4. Report any injury immediately to your instructor.
5. Inventory your tools prior to beginning your project. Inventory your tools again after the project has been completed.
6. Place all cuttings in trash receptacle.

COTTER PINS (PREFERRED METHOD)

PROCEDURAL STEPS

Step 1. Install cotter pin.

- a. Examine a cotter pin and identify its dimension and parts. See figure 5.

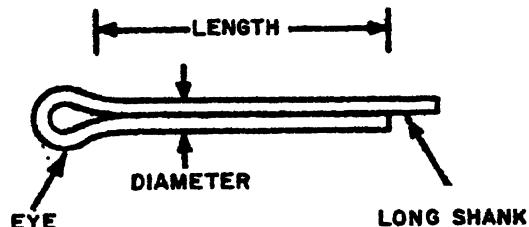


FIGURE 5

b. Insert cotter pin through castellated nut slot and drilled bolt passageway (the long shank should be on top). See figure 6.

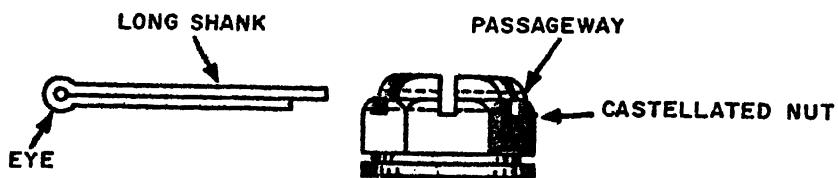


FIGURE 6

c. Select the diagonal cutting pliers from the tool board.

d. Press the eye of the cotter pin with the back of the diagonal cutting pliers until a snug fit is obtained.

* NOTE *

*The eye of the cotter pin should be well down IN the castellation. See figure 7.

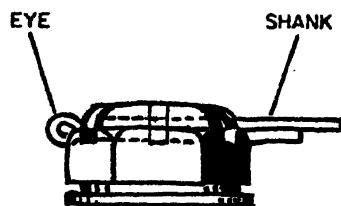


FIGURE 7

e. Grasp the end of the long shank with the diagonal cutting pliers and bend the shank back over the end of the bolt.

* NOTE *

*Keep the shank tight against the bolt as you bend it over the end. See Figure 8.

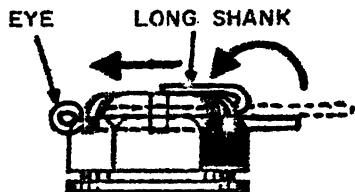


FIGURE 8

- f. Cut the cotter pin shank with the diagonal cutting pliers to a length that will bring the end to the center of the bolt.

WARNING

Cup one hand over the work to prevent eye injury.

- g. Press the end of the cotter pin with the back of the diagonal cutting pliers for a snug fit.
- h. Cut the remaining shank to such a length that the end of the shank will just clear the washer when the shank is pressed down the side of the nut. See figure 9.

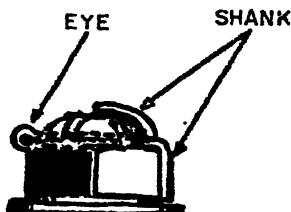


FIGURE 9

- i. Repeat steps 1a through 1h for ONE additional castellated nut.

COTTER PINS (ALTERNATE METHOD)

JOB STEPS

STEP 1. Install cotter pin.

- a. Insert a cotter pin in a castellated nut and through the drilled bolt passageway.
- b. Press the eye of the cotter pin with the back of the diagonal cutting pliers until a snug fit is obtained.

* NOTE *

*The eye of the cotter pin should be snug against the castellation. See figure 10.

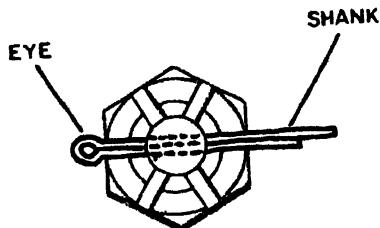


FIGURE 10

- c. Separate the cotter pin shanks with the diagonal cutting pliers.
- d. Press the cotter pin shanks with the back of the diagonal cutting pliers to obtain a snug fit around the castellated nut. See figure 11.

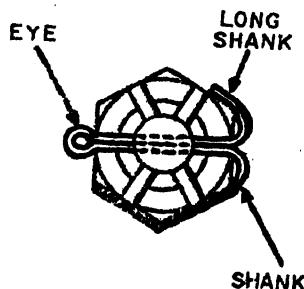


FIGURE 11

e. Place all cuttings in trash receptacle.



Have work checked by a shop instructor.

Instructor Initials

* NOTE *

* This completes the cotter pin section of Job Program II.

LOCKWIRE SAFETYING

Lockwiring is a method of wiring together two or more screws or boltheads in such a manner that any tendency of one to loosen is counteracted by the tightening of the wire.

SAFETY PRECAUTIONS:

1. Caution should be exercised when cutting and handling safety wire; it can put out an eye or gouge the skin if not properly used.
2. Cut all lockwire at a right angle, leaving no sharp points.
3. Place all cuttings in a trash receptacle.

LOCKWIRE: SINGLE-WIRE METHOD

JOB STEPS

STEP 1: Reposition shop fixture in vise. Clamp fixture vertically in vice, with boltheads and screwheads facing you. See figure 12.

WARNING

Ensure that the vise is tight, holding fixture in place.

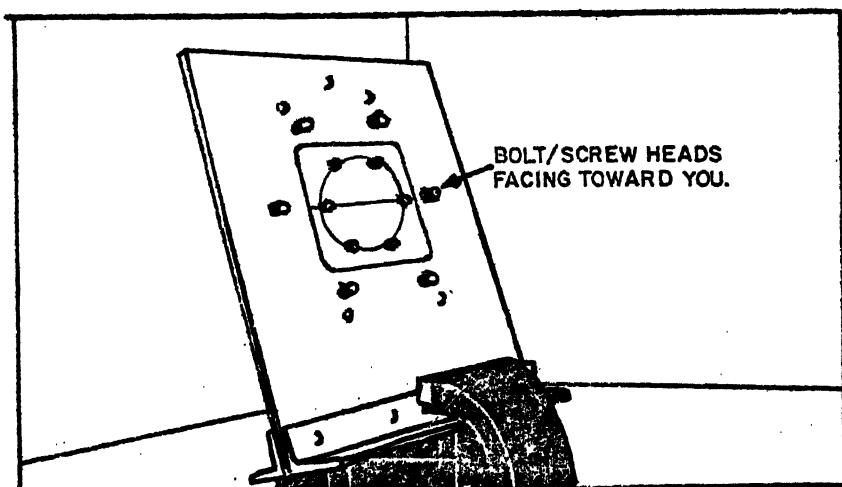


FIGURE 12

STEP 2: Determine the wire length.

- a. Select the steel rule from the tool board.
- b. Measure the distance from CENTER of first screwhead to the CENTER of the second with a steel rule. See figure 13.

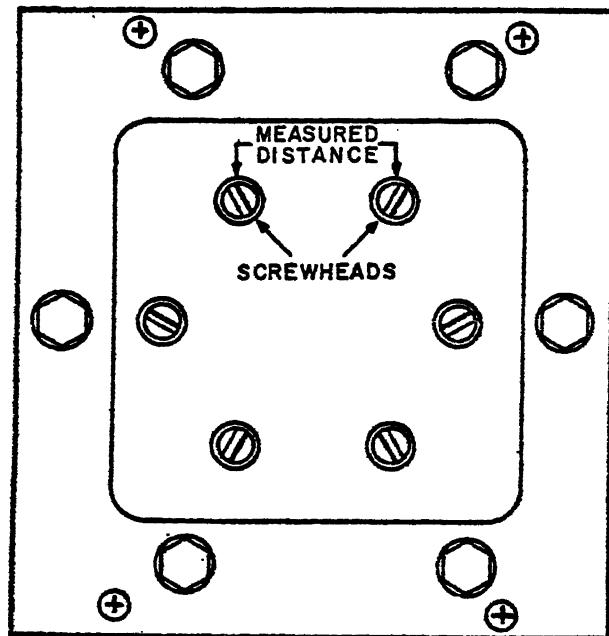


FIGURE 13

- c. Multiply that distance by the number of screws to be lockwired.
- d. Add 10 inches.
- e. Unroll wire from the spool and measure to the proper length.

* NOTE *

* See next page for proper cutting procedures.

f. Cut wire, using the diagonal cutting pliers.

WARNING

Always cut wire at a right angle, leaving no sharp points. See figure 14.

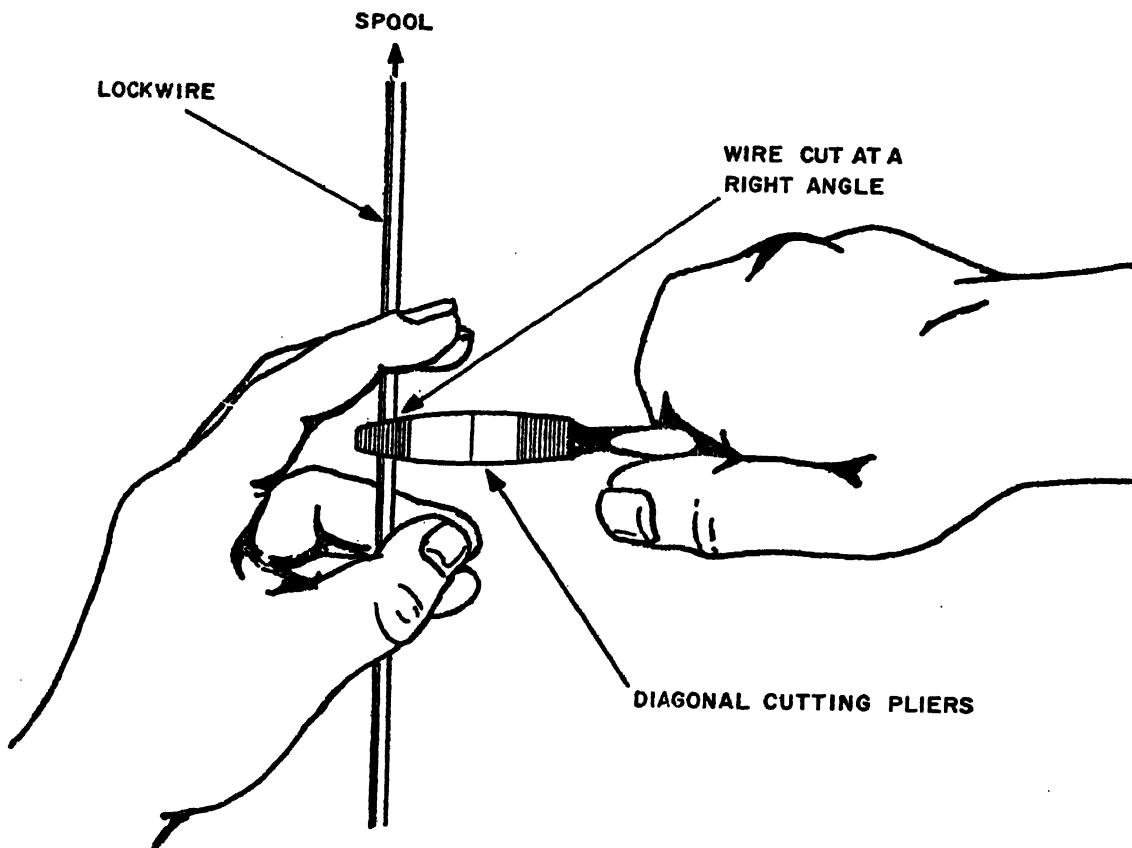


FIGURE 14

g. To keep lockwire from unrolling on spool, hook end of through hole in spool and bend it over.

STEP 3: String wire.

a. Insert the wire through the drilled passageway of one of the screwheads.

* NOTE *

* Leave 4 inches of wire on the left side of the screwhead, bend this up toward the top of the plate. See figure 15.

b. Bend the long strand down tight against the screwhead, keeping metal-to-metal contact. See figure 15.

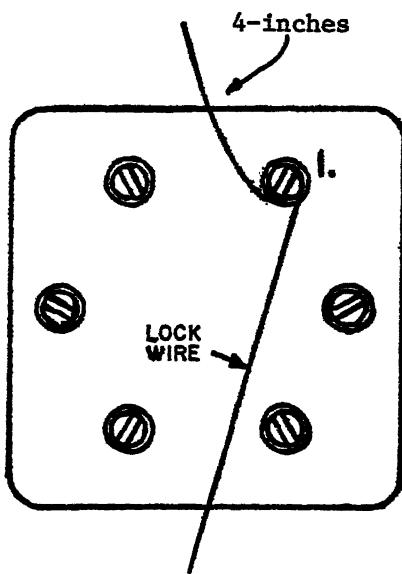


FIGURE 15

c. Insert the long wire through the next screwhead.

d. Select duckbill pliers from the tool board.

e. Pull the wire TIGHT with a SNAP, using the duckbill pliers.

* NOTE *

* (1) Ensure that the wire is pulling the screws CLOCKWISE.

* (2) Grasp the wire only at the end with the duckbills.

* (3) Ensure that lockwire is kept TIGHT between screws.

f. Keeping wire tight, bend it down at a right angle.

* NOTE *

* Keep a TIGHT "Z" pattern. See figure 16.

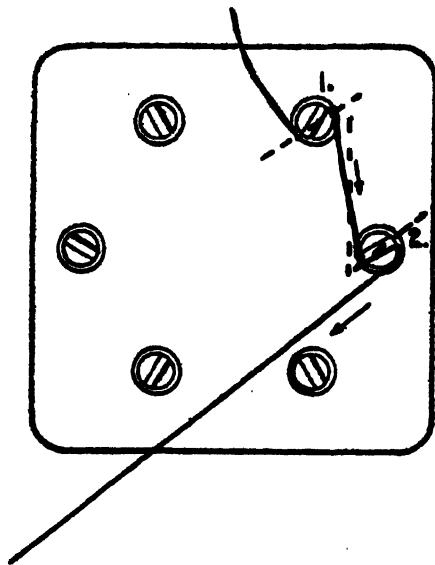


FIGURE 16

g. Repeat steps 3c through 3f for the remaining screws.
See figure 17.

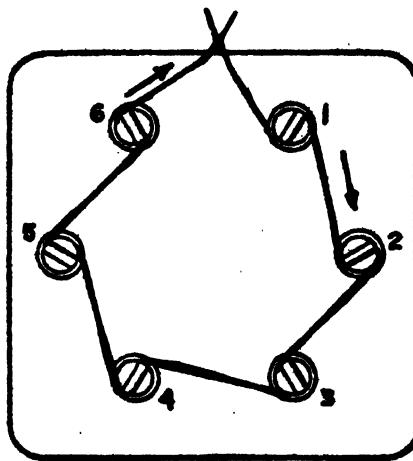


FIGURE 17

STEP 4: Holding the two ends of the wire, one in each hand, bring the wires together between the two remaining screwheads and make one "counter-clockwise" twist.

* NOTE *

* Make the twist so that there is as little slack in the wire as possible.

STEP 5: Keeping the wires tight and at right angles, make 6 to 7 additional "counterclockwise" twists.

* NOTE *

* (1) Keep twists uniform.

* (2) Do not wrap one wire around the other.

* (3) Finger tips should NOT be any farther than 6 inches from screwheads as twists are made.

STEP 6: Grasp the wire with duckbill pliers on the last twist; give one 360° twist. See figure 18.

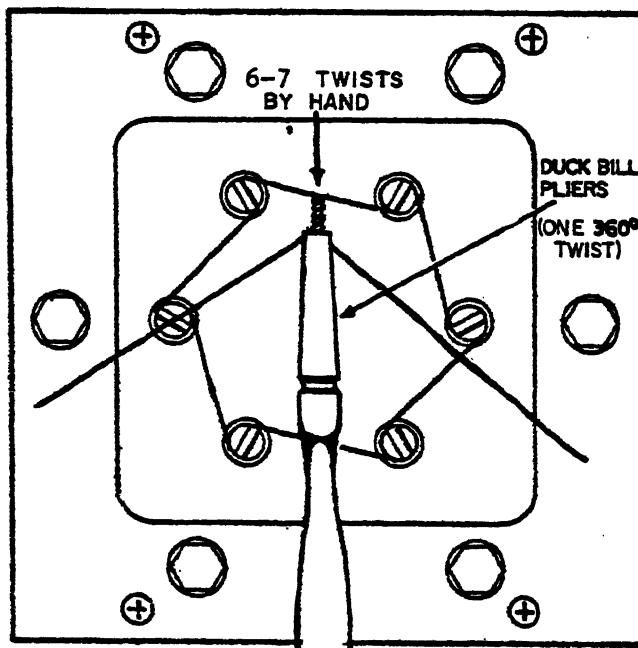


FIGURE 18

STEP 7: Cut wire.

- a. Measure 3/4-inch from the first twist with a steel rule.
- b. Cut the wire at that point with diagonal cutting pliers.
See figure 19.

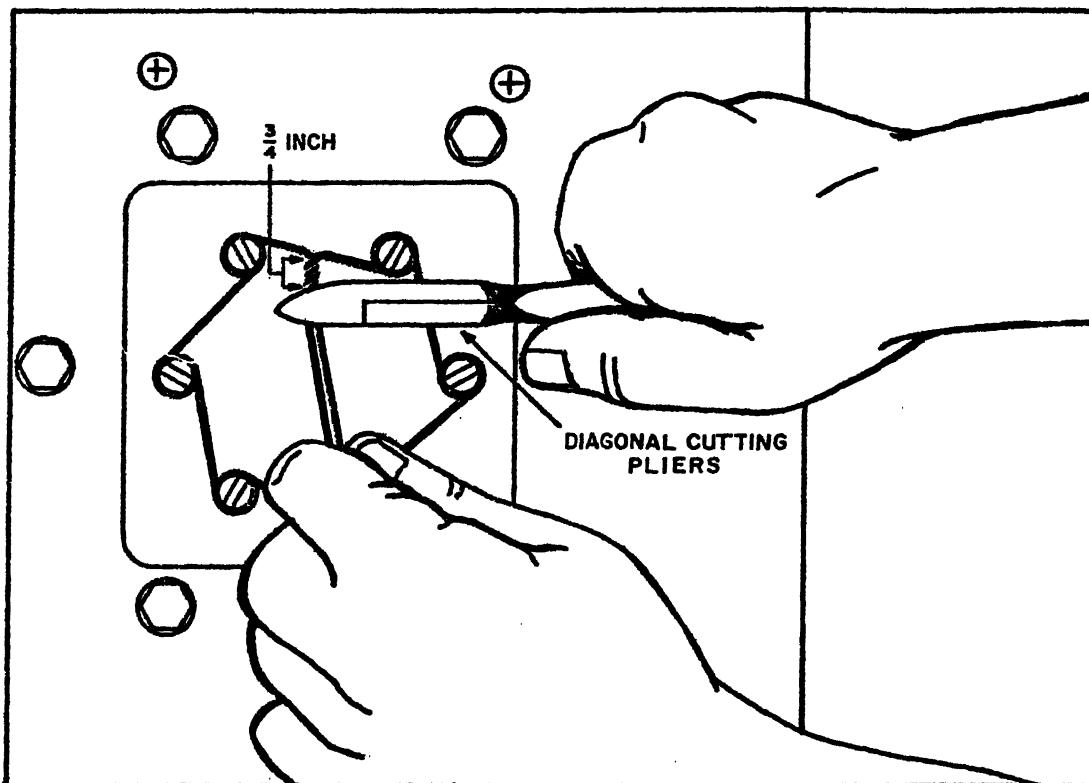


FIGURE 19

WARNING

Hold the tip of the wire to prevent injury.

STEP 8: Grasp the tip of the wire with the diagonal cutting pliers and roll the end back toward the plate to form a pigtail. See figure 20.

WARNING

Unrolled ends may cause personal injury.

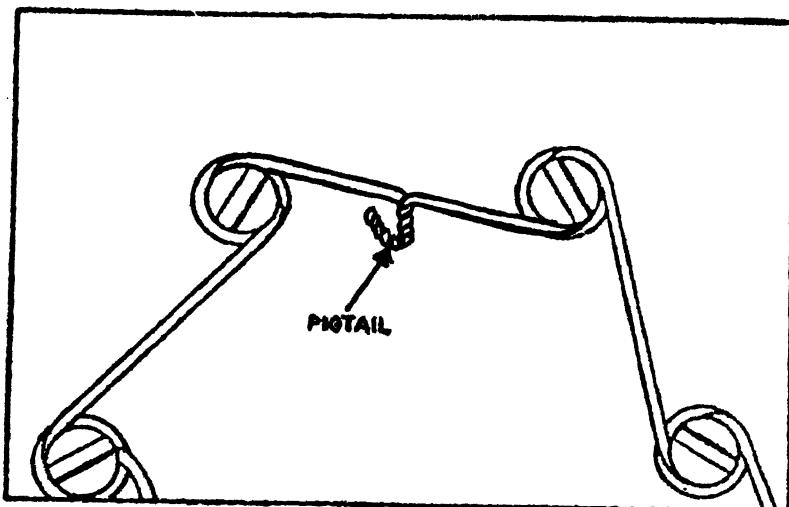


FIGURE 20



Have work checked by a shop instructor.

Instructor Initials

This completes the single-wire method of lockwiring section of Job Program II.

LOCKWIRE; DOUBLE-TWIST METHOD

JOB STEPS

STEP 1: Determine wire length. (Start with the three boltheads on the LEFT-SIDE of the fixture).

- a. Measure the distance from the center of first bolthead to the center of the second with a steel rule.
- b. Measure the distance from the center of the second bolthead to the center of the third.
- c. Add the two distances together.
- d. Multiply the total by four.
- e. Add an additional two inches to insure enough wire.
- f. See STEP 2e through 2g, pages 15 and 16, for the proper cutting procedure.

STEP 2: Lockwire the three boltheads on the left side of the shop fixture. (Utilize directions below)

* NOTE *

* Figure 25 on page 26 is an illustration of the completed project (Torqueing and Safetying).

- a. Insert the wire through the drilled bolt passageway in the TOP LEFT bolthead, leaving an equal length of wire on each side.
- b. Bend the left wire around the top of the bolt CLOCKWISE and down BEHIND the wire on the right side. See figure 21.

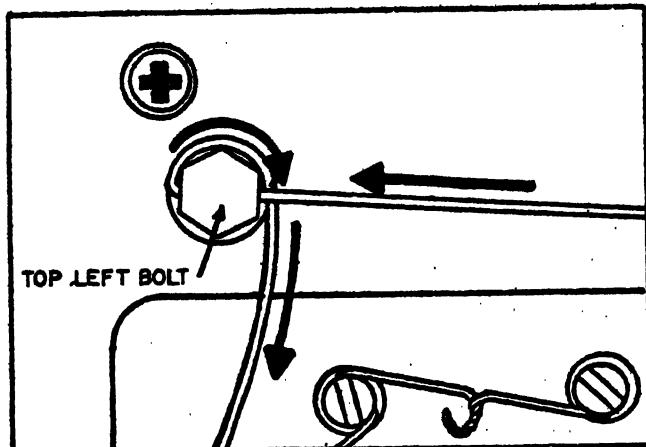


FIGURE 21

c. Grasp wires, one in each hand, with fingers not more than 6 inches from the boltheads; give one twist CLOCKWISE.

* NOTE *

* Keep the wire tight across top of the bolthead.

d. Keeping the wires tight and at right angles (90°) continue twisting until wires are one twist from the hole on the left side of the second bolthead.

* NOTE *

* (1) Do not twist the wires too far.

* (2) Do not untwist lockwire. NEVER retwist or reuse lockwire.

* (3) Keep twists uniform.

* (4) Keep 8 to 10 twists per inch.



Wires with too many twists MUST be cut and removed.

e. With wires on the left side of the second bolthead, pass the RIGHT wire through the drilled passageway. See figure 22.

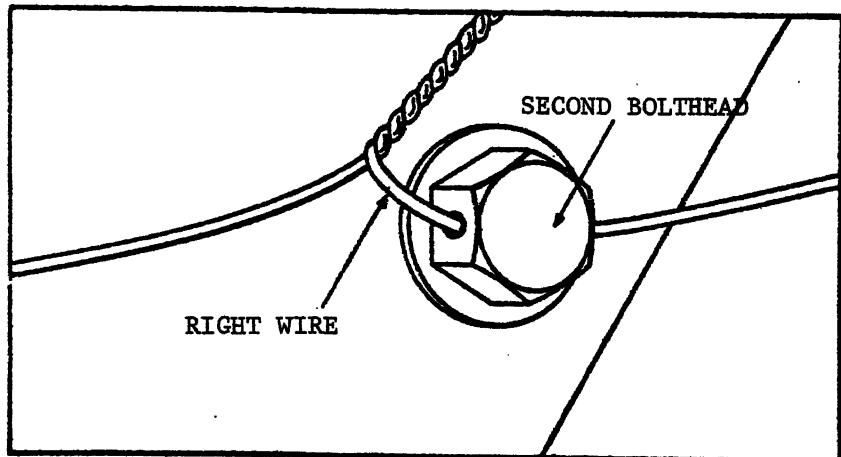


FIGURE 22

f. Pulling the wire tight with the duckbills, wrap the LEFT wire around the bottom of the Bolthead and behind the RIGHT wire on the right side of the Bolthead; give one COUNTERCLOCKWISE twist. See figure 23.

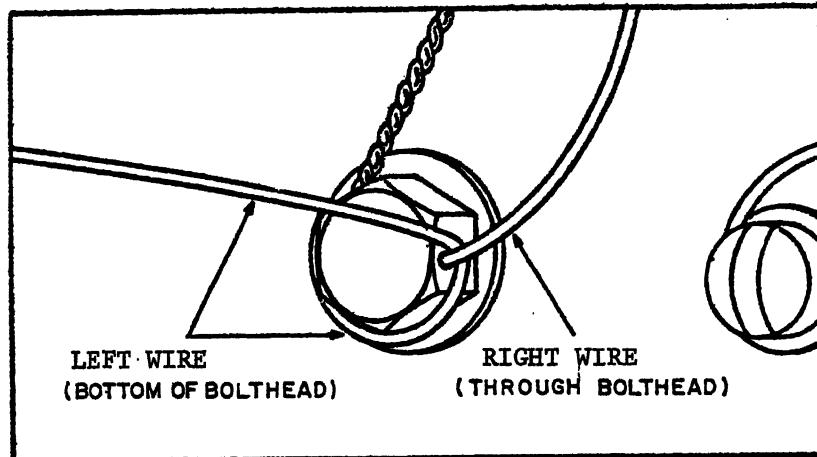


FIGURE 23

g. Keeping wires tight and at right angles (90°), continue twisting COUNTERCLOCKWISE until the wires are one twist from the hole on the left side of the third head.

- (1) Do not twist wires too far.
- (2) Do not untwist lockwire. NEVER retwist or reuse lockwire.
- (3) Keep twists uniform.
- (4) Keep 8 to 10 twists per inch.



Wire with too many twists MUST be cut and removed.

- h. With wires on the left side of the bolthead, pass the RIGHT wire through the drilled bolt passageway.
- i. Pulling the wire tight with the duckbills, wrap the LEFT wire around the bottom of the bolthead and behind the RIGHT wire on the right side of the bolthead give one COUNTER-
CLOCKWISE twist. See figure 23.
- j. Keeping the wires tight and at right angles, make 6 to 7 COUNTERCLOCKWISE twists.
- k. Grasp wires with the duckbill pliers on the last twist; give one 360° twist counterclockwise.

STEP 3: Cut wire.

- a. Measure 3/4 inch from the first twist with a steel rule.
- b. Cut the wire at that point with the diagonal cutting pliers.

WARNING

Hold the tip of the wire when cutting to prevent injury.

- c. Grasp the tip of the wire with the diagonal cutting pliers and roll the end back toward the bolthead to make a pigtail. See figure 24.

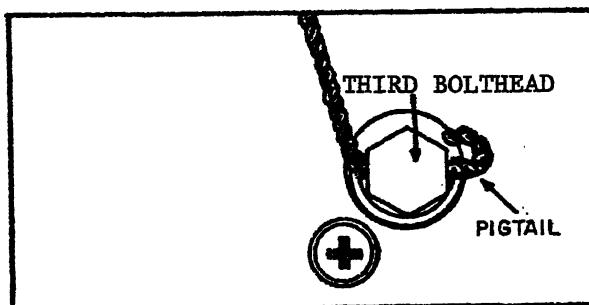


FIGURE 24

STEP 4: Repeat steps 1 through 3 for the three remaining bolts on the right side of the shop fixture.

* NOTE *

* Refer to figure 25, it shows completion of double-twist safety wire procedures.



Ensure that lockwire is tightening bolts at all times.

Figure 25



1. Have work checked by a shop instructor.

Instructor Init

2. Having completed the skill test, proceed with t cleanup outlined on page 27.

CLEAN-UP

JOB STEPS

STEP 1: Remove all lockwire from shop fixture.

WARNING

Cup hand over wire when cutting to prevent injury.

STEP 2: Remove all cotter pins.

STEP 3: Remove all bolts, screws, nuts, and washers and place in tray.

STEP 4: Return all tools to proper locations on toolboard.

STEP 5: Inventory all tools.

STEP 6: With a foxtail and dust pan, sweep vise, bench, and area clean.

STEP 7: Using a rag, wipe each metal tool and vise with a light film of oil.

* NOTE *

* DO NOT oil the file, clean with a file card.

STEP 8: Secure vise sideways on bench with one-half inch between the jaws. Leave lock-down screw loose.

STEP 9: Place shop fixture on bench in the proper location.



Raise your hand.

Instructor Initials

* NOTE *

*Congratulation! This completes your shop assignment and Job Program II.

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